GenRad

GR1000e, GR2000, GR4000 Service Manual

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Printed in U.S.A.
October, 1998

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Symbol ⚠ IEC417 on equipment signifies that the manual contains information to prevent injury or equipment damage. Refer to page vi and to other manuals in set.

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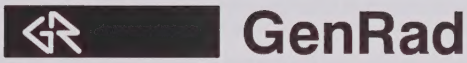

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WARNINGS

- Do not remove covers. Potentially lethal voltages are present inside the system. Observe all WARNING markings on the equipment and WARNING notices in the manual. If servicing is necessary, it should be performed only by a qualified person familiar with the electrical shock hazards present inside the system.

- Grounding circuit continuity is vital for safe operation of the equipment. Never operate equipment with grounding conductor disconnected.

- Safeguard your hands and fingers while handling any fixture or other accessory. Be sure it is securely supported if you reach under it. If it is heavy, you must have another person help to move it.

- The symbol IEC417 on equipment signifies that the manual contains information to prevent injury or equipment damage. Observe and heed all WARNING notices in the manuals and the equipment. WARNINGS call attention to personnel safety information.

- Replace any fuse only with the same type and ratings as labeled on the equipment and/or listed in the manual.

MISES EN GARDE

- Ne pas enlever les couvercles. Les niveaux de tension se trouvant dans le système sont extrêmement dangereux. Respectez toutes les consignes de sécurité figurant sur l'équipement et les MISES EN GARDE données dan ce manuel. Seule une personne qualifée, connaisant les risques de décharge électrique du système, est autorisée à effecteur les opérations de nettoyage ou de réparation du système.

- Le circuit doit être mis à la terre sans discontinuation pour garantir un fonctionnement sans danger de l'équipement. Ne jamais faire fonctionner l'équipement pendant que le raccord à la terre est déconnecté.

- Protégez-vous les mains et les doigts pendant le maniement de tout dispositif de serrage ou autre accessoire. Assurez-vous que ceux-ci soient bien solidement fixés en place, avant de vous pencher sous eux. Si l'accessoire en question est trop lourd, faites-vous aider pour le déplacer.

- Le symbole IEC417 figurant sur l'équipement signifie que le manuel contient des informations permettant d'empêcher les accidents ou l'endommagement de l'équipement. Respectez toutes les consignes de MISES EN GARDE données dans le manuel et figurant sur l'équipement. Les MISES EN GARDE attirent l'attention sur la nécessité de se protéger.

- Ne remplacez les fusibles qu'avec des fusibles du même type et de la même valuer que ceux mentionnés sur l'équipement et figurant dans le manuel.

WARNHINWEISE

- Abdeckungen nicht entfernen. Potentiell lebensgefährliche Spannungsbedingungen innerhalb des Systems vorhanden. Alle auf der Einrichtung befindlichen WARNMARKIERUNGEN und im Handbuch enthaltenen WARNHINWEISE beachten. Wartungsarbeiten dem qualifizierten Personal überlassen, das mit den innerhalb des Systems vorhandenen Gefahren eines elektrischen Schlags vertraut ist.

- Die Erdung des Schaltungsdurchgangs ist eine Grundvoraussetzung für den sicheren Betrieb der Einrichtung. Einrichtung niemals ohne Erdleiter betreiben.

- Hände und Finger bei der Handhabung einer Spannvorrichtung oder eines anderen Zubehörteils schützen. Sich vor der Plazierung der Hände unterhalb der Einrichtung vergewissern, daß die Einrichtung über ausreichenden Halt verfügt. Falls die Einrichtung schwer ist, sich von einer anderen Person beim Tragen helfen lassen.

- Das auf der Einrichtung befindliche Symbol IEC417 bedeutet, daß das Handbuch Informationen zur Verhinderung von Körperverletzungen oder Sachschäden enthält. Alle in den Handbüchern enthaltenen und auf der Einrichtung befindlichen WARNHINWEISE beachten und befolgen. WARNHINWEISE sollen auf Informationen zur persönlichen Sicherheit aufmerksam machen.

- Sicherungen nur durch Sicherungen des gleichen Typs und der gleichen Nennleistung ersetzen. Auf der Einrichtung befindliche Etiketten und im Handbuch enthaltene Informationen zu Rate ziehen.

AVISOS

- Não remova as tampas. Há voltagens potencialmente fatais presentes na parte interna do sistema. Observe todas as marcações de AVISOS no equipamento e discrições de AVISOS no manual. Se for necessário fazer manutenção, esta deve ser feita somente por uma pessoa qualificada familiarizada com os perigos de choques elétricos presentes na parte interna do sistema.

- A continuidade do circuito de aterramento é vital para a operação segura do equipamento. Nunca opere o equipamento com o cabo de aterramento desligado.

- Proteja as suas mãos e dedos ao operar qualquer dispositivo ou outro acessório. Certifique-se que ele esteja suportado com segurança se você tiver que alcançar algo debaixo dele. Se for pesado, você deve ter a ajuda de uma outra pessoa para movê-lo.

- O simbolo IEC417 no equipamento significa que o manual contém informações para prevenir ferimentos ou danos ao equipamento. Observe e preste atenção a todos os AVISOS nos manuais e no equipamento. Os AVISOS chamam a atenção a informações sobre a segurança pessoal.

- Substitua qualquer fusivel somente com um do mesmo tipo e da mesma capacidade nominal como marcado no equipamento e listado no manual.

ADVERTENCIAS

- No quitar las tapas. En el interno del sistema hay voltajes potencialmente mortales. Obsérvense todos los rótulos de ADVERTENCIA presentes en el equipo, así como la descripción de las notas de ADVERTENCIA presentadas en el manual. De ser necesario, el servicio de mantenimiento deberá ser efectuado únicamente por personal calificado que esté familiarizado con los peligros de choque eléctrico presentes en el sistema.

- La continuidad del circuito de puesta a tierra es de vital importancia para el functionamiento seguro del equipo. Nunca se debe usar el equipo con el conductor de puesta a tierra desconectado.

- Protéjanse las manos y los dedos toda vez que sea necesario manipular un dispositivo u accesorio. Cerciorarse de que el mismo esté firmemente sujetado antes de proceder a trabajar debajo de él. Si el aparato u accesorio fuera pesado, pedir la ayuda de otra persona para moverlo.

- El simbolo IEC417 que aparece en el equipo significa que el manual contiene informaciones para evitar lesiones personales o daños al equipo. Obsérvense y préstese atención a toda las notas de ADVERTENCIA presentes en los manuales y en el equipo. Las ADVERTENCIAS sirven para llamar la atención sobre informaciones de seguridad para el personal.

- Reemplazar los fusibles únicamente con otros del mismo tipo y capacidad, según lo indique el rótulo en el equipo y la descripción en el manual.

CAUTIONS

- Observe and heed all CAUTION notices in the manuals and on the equipment. CAUTIONS call attention to information about safeguarding *equipment* from damage.

HANDLING PRECAUTIONS FOR ELECTRONIC DEVICES SUBJECT TO DAMAGE BY STATIC ELECTRICITY

Place instrument or module to be serviced, spare parts in conductive (anti-static) envelopes or carriers, hand tools etc. on a work surface defined as follows. The work surface must be conductive and reliably connected to earth ground through a safety resistance of approximately 250 kilohms. The surface must **NOT** be metal. (A resistivity of 30 to 300 kilohms per square inch is suggested.) Avoid placing tools or electrical parts on insulators.

Ground the frame of any line-powered equipment, test instruments, lamps, soldering irons, etc., directly to earth ground. To avoid shorting out the safety resistance, be sure that grounded equipment has rubber feet or other means of insulation from the work surface. The module being serviced should be insulated while grounded through the power-cord ground wire, but must be connected to the work surface before, during and after any disassembly or other procedure in which the line cord is disconnected.

Exclude any hand tools (such as non-conductive plunger-type solder suckers) that can generate a static charge.

Ground yourself reliably, through a resistance, to the work surface; use, for example, a conductive strap or cable with a wrist cuff. The cuff must make electrical contact directly with your skin; do **NOT** wear it over clothing. (Resistance between skin contact and work surface through a commercially available personnel grounding device is typically 250 kilohms to 1 megohm.)

If any circuit or IC packages are to be stored or transported, enclose them in conductive envelopes or carriers. Remove them only with the above precautions; handle IC packages without touching the contact pins.

Avoid circumstances that are likely to produce static charges, such as wearing clothes of synthetic material, sitting on a plastic-covered stool (particularly while wearing wool), combing your hair, or making extensive erasures. *These circumstances are most significant when the air is dry.*

When testing static sensitive devices, be sure dc power is on before, during, and after application of test signals. Be sure all pertinent voltages have been switched off while boards or components are removed or inserted.

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Preface

Overview

This service manual provides service information and procedures for the GR1000e, GR2000, and GR4000 GENEVA Test Systems. The manual provides detailed descriptions of the test systems, periodic maintenance procedures, operational verification procedures, and removal and replacement procedures for field replaceable units. The manual includes other related information such as lists of replacement modules.

Audience

This manual will benefit:

- Service Engineers
- Service Technicians

About this Manual

This section identifies the knowledge or tasks described in the chapters and appendices of this manual.

For information about	Read this Chapter or Appendix
the system configuration, the system layout description, the location of internal and external system components and devices, and the different types of fixture interfaces	System Overview
unpacking and installing the system and its peripherals, and the verification testing necessary for normal operation	Installation
cleaning instructions for the system exterior, the monitor, the air filters and a preventive maintenance schedule	Preventive Maintenance
removal and replacement procedures for field replaceable units (FRUs)	Subsystem Removal and Replacement
the operational verification program (OVP), how to interpret the resulting messages, the nature of a failure and the suspect module, and suggestions about module replacement	Operational Verification Program
servicing your system, such as power monitoring, and power supply pin assignments to the receiver power block	Other Servicing Information
Field Replaceable Units (FRUs) related to this system	Field Replacement Units
the interconnection of system subassemblies, with cable part numbers and connector identification	System Interconnect Diagrams (GR1000e, GR2000, and GR4000)
technical information about the internal subsystems of the GENEVA GR1000e, GR2000, and GR4000 systems	Technical Summary
the optional GENEVA GR1000e, GR2000, and GR4000 vacuum controller	GR1000e, GR2000, and GR4000 Vacuum Controller

Related GenRad Documentation

This section lists other GenRad manuals that may provide supporting or related information.

Manual Title	How it relates or supports this manual
GENEVA Hardware Modules Manual	provides detailed technical information about the VXIbus controller
GR1000e, GR2000, GR4000 Site Preparation Guide	provides installation preparation information
ENCOMPASS 1.3.1 User's Guide	provides relay driver information for test systems running ENCOMPASS 1.3.1 software.
Guide to ENCOMPASS	provides relay driver information for test systems running ENCOMPASS 2.x software.
GENEVA Test Fixture Manual	provides information on wiring for the fixture relay drivers

Non–GenRad Documentation

This section lists non–GenRad manuals that may provide useful information.

Manual Title	How it relates or supports this manual
National Instruments VXI–MXI User Manual	provides detailed information, specifications, and theory of operation of the VXI–MXI
Okidata Microline 320/321 Setup Guide	provides operation information

Document Conventions

The following document conventions are used throughout the documentation set.

Convention	Indicates
`Bold monospace text`	command text that you enter
Bold text	commands, keys, buttons, prompts, menu options, icons, and literals within text
`Courier text`	command, syntax, or error message
`Italic monospace text`	replace the *`term`* with a valid entry
Italic text	manual title, chapter title, or section title
P/N or PN	part number
[*text, text*]	field within the brackets is optional
{text, text}	select one or more choices within the braces
CAUTION	potential harm to the system or equipment as a result of this action
Example	the beginning of an example
End Example	the end of an example
NOTE	specialized information that may benefit you
NEXT	informational options that direct you to the next chapter or step
WARNING	potential harm to you as a result of this action

Manual Reorder Information

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Part Number	Part Number (w/ 3-ring Binder)	Contact
9007-3008-02	N/A	GenRad Parts Sales 7 Technology Park Drive Westford, MA 01886-0033 Phone: (978) 589-7000 1-800-4-GENRAD (USA Only) (1-800-443-6723) To connect to Parts Sales, select the number 1, then the number 3. Fax: (978)-589-2064

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Before contacting the Customer Care Center, please have the following information available:

- Your site number
- Hardware system type
- System serial number
- Software version number

You can contact the Customer Care Center by:

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World Wide Web	http://www.genrad.com
FTP	`ftp.genrad.com` **login:** anonymous **password:** your e-mail address `cd pub/pub` (public, for directory use ls) or `cd pub/incoming` (public, directory cannot be seen)

System Overview

WARNING **To avoid personal injury, and to prevent the risk of electric shock, do not perform any maintenance or servicing described in this manual unless you have appropriate technical training and experience to perform tasks in service areas of the equipment. You should be aware of hazards involved and how to minimize danger to yourself or other persons.**

These service instructions are for use by qualified service personnel only. Examples of such personnel are electricians and GenRad's or customer's factory-trained personnel. Maintenance procedures that do not involve the use of tools for access inside the equipment may be performed by an operator. Refer to the WARNINGS and CAUTIONS notices in the front of this manual.

System Configuration

The standard test system configuration consists of the system bay mainframe, personal computer (PC), monitor, mouse, and keyboard. The PC is the control device for the system. The GR1000*e*, GR2000, and GR4000, are self-contained, rack-mountable units designed to operate in a system bay mainframe. Refer to the *GR1000e, GR2000, GR4000 Site Preparation Guide* for dimensions and configuration of the standard test system, if required.

System Layout

This section gives an overview of the physical layout of the GR1000*e*, GR2000, and GR4000 systems. Refer to Table 1–1 to locate the drawings with the major subassemblies for your system.

Table 1–1
Drawing Locations

System	Figures
GR1000*e*	Figure 1–1 - Figure 1–3
GR2000	Figure 1–4 - Figure 1–6
GR4000	Figure 1–7 - Figure 1–9

Fixture to System Interfacing

The receiver consists of one power block and up to 25 scanner connector assemblies. These mate with the receiver connectors that are part of the fixture assembly. Fixture assemblies are available from GenRad-approved fixture manufacturers.

Modular VXI/scanner Cage

Instrument and scanner modules are located in this cage and are accessed from the front of the system. Refer to Figure 1–1, Figure 1–4, and Figure 1–7, for instrument and scanner backplane locations.

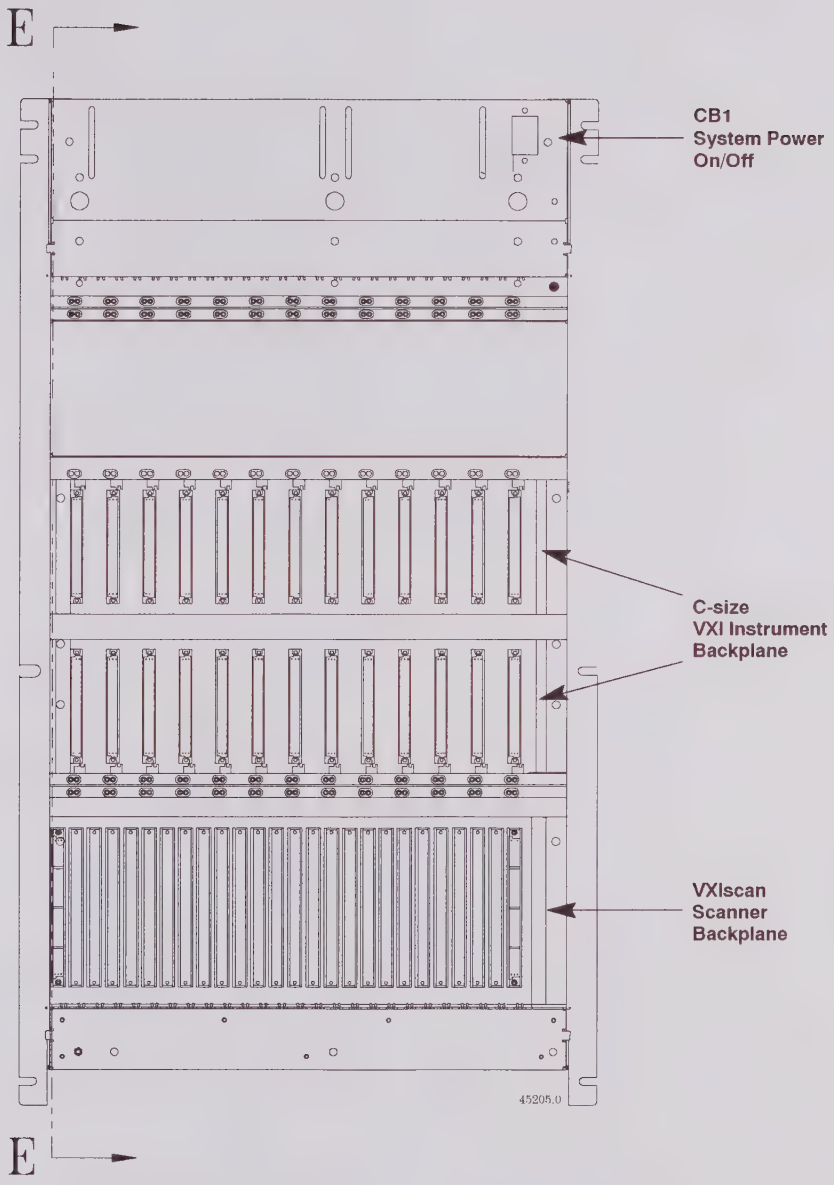


Figure 1–1 GR1000*e* Front View

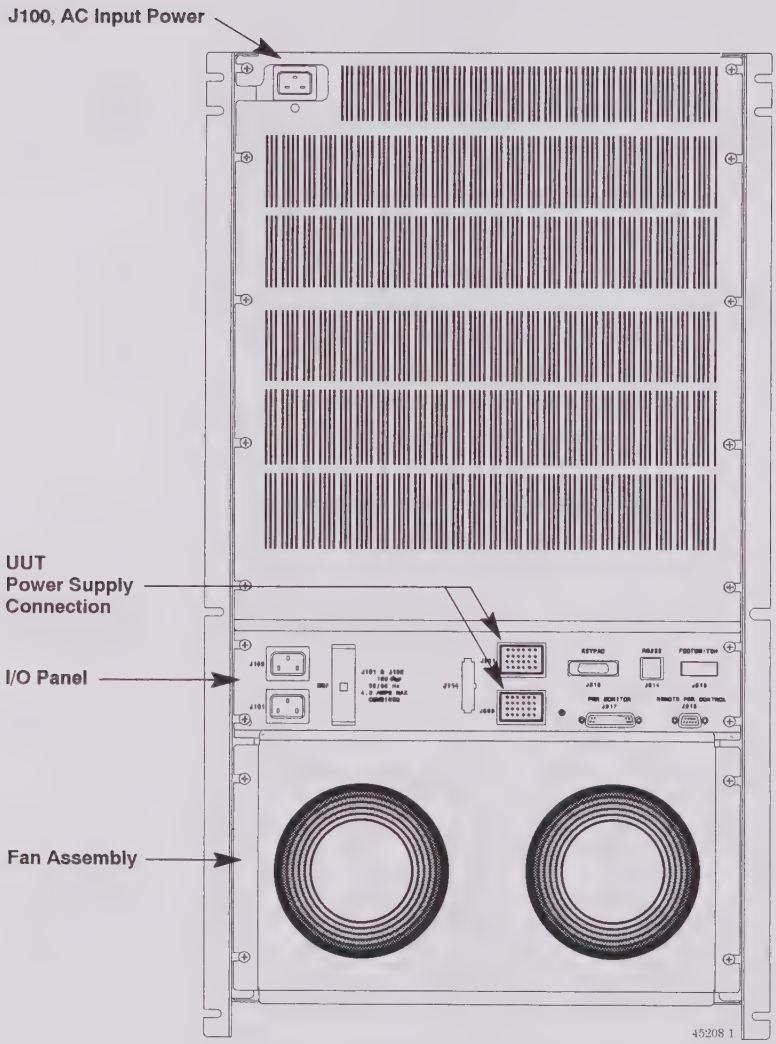


Figure 1–2 GR1000*e* Rear View

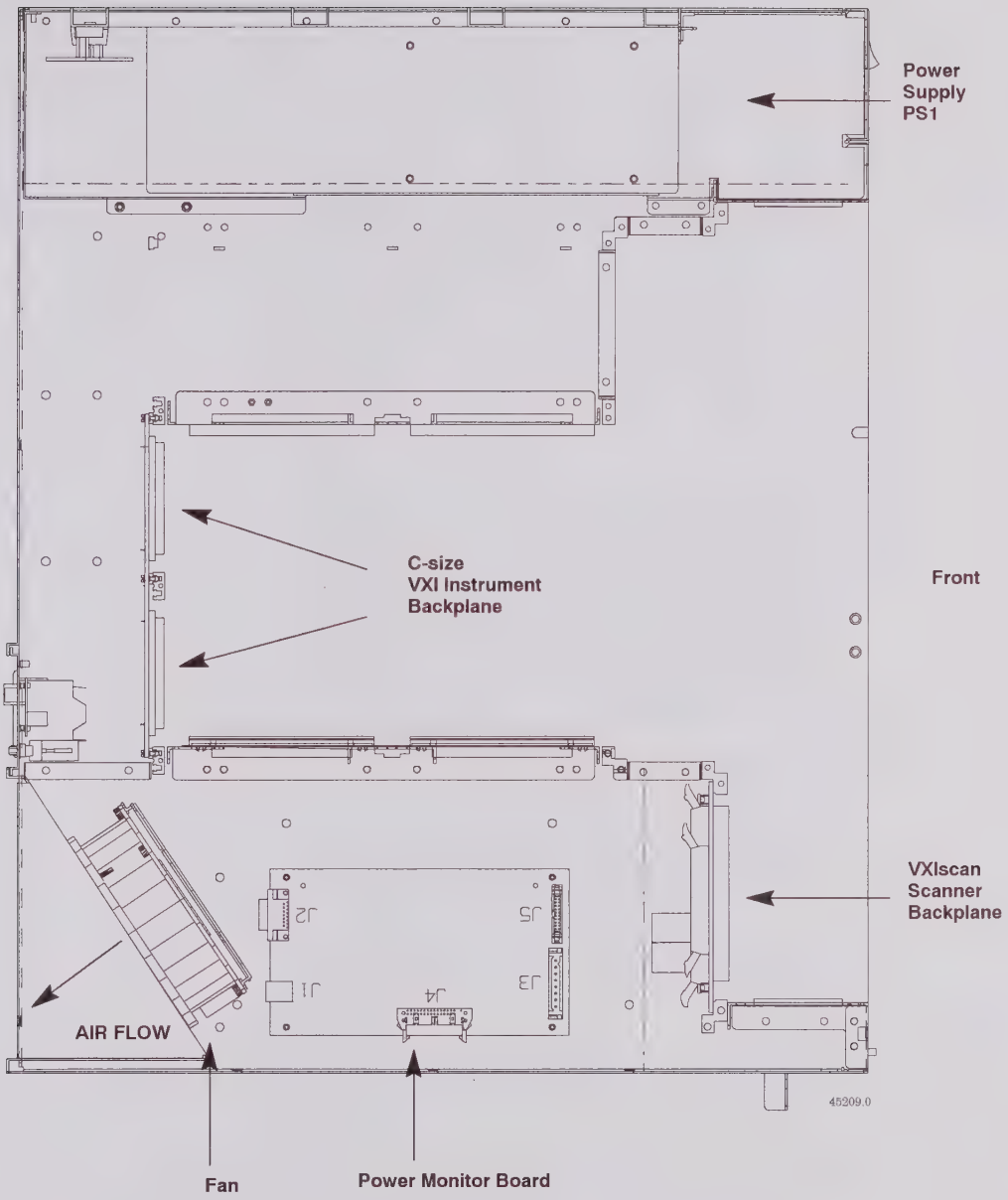


Figure 1–3 GR1000*e* Left Side View - Section E-E

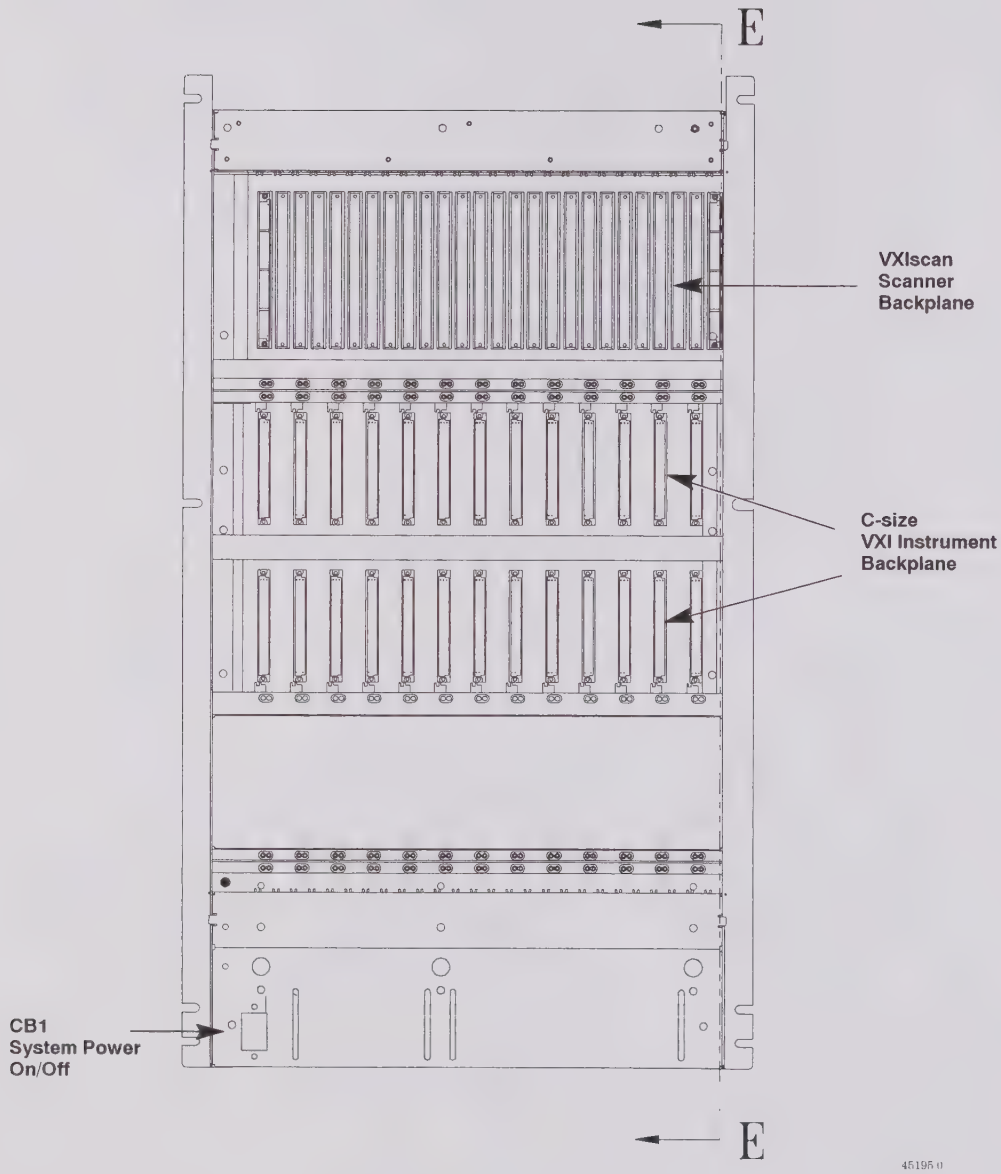


Figure 1–4 GR2000 Front View

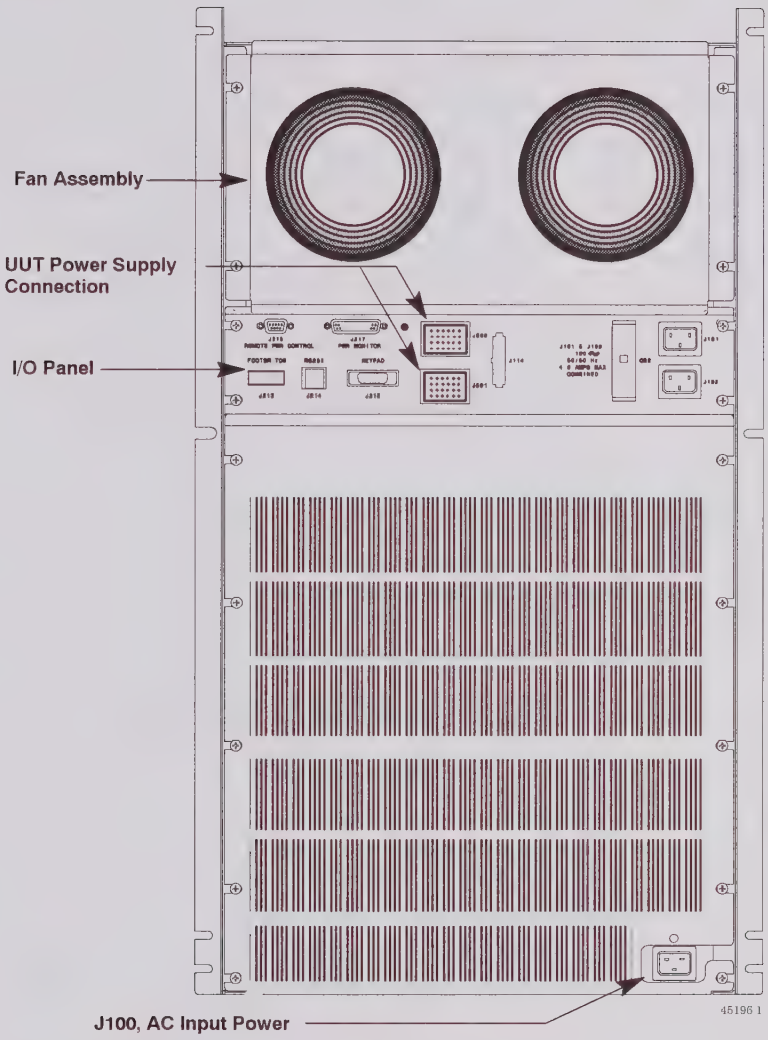


Figure 1–5 GR2000 Rear View

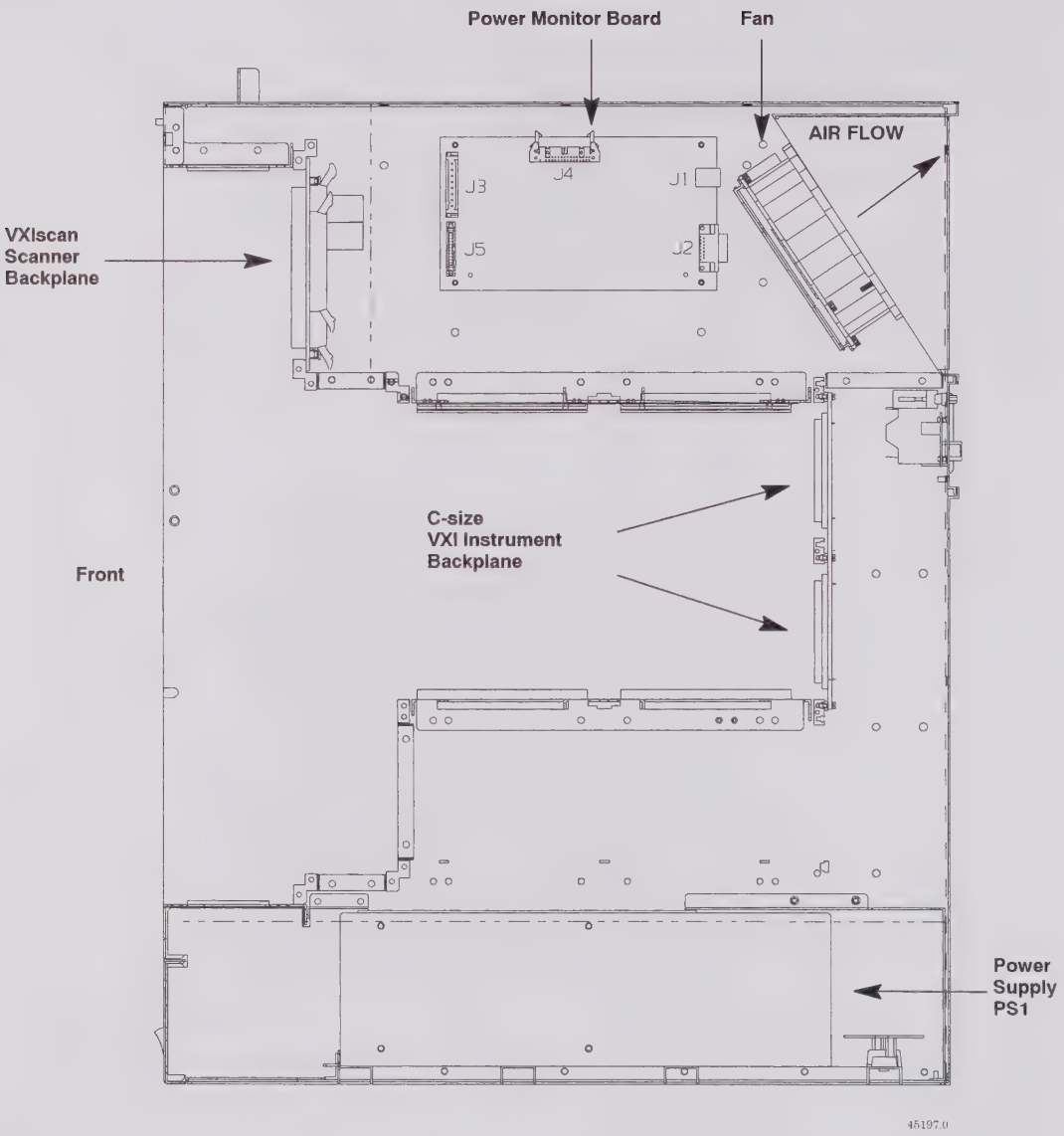


Figure 1–6 GR2000 Right Side View - Section E-E

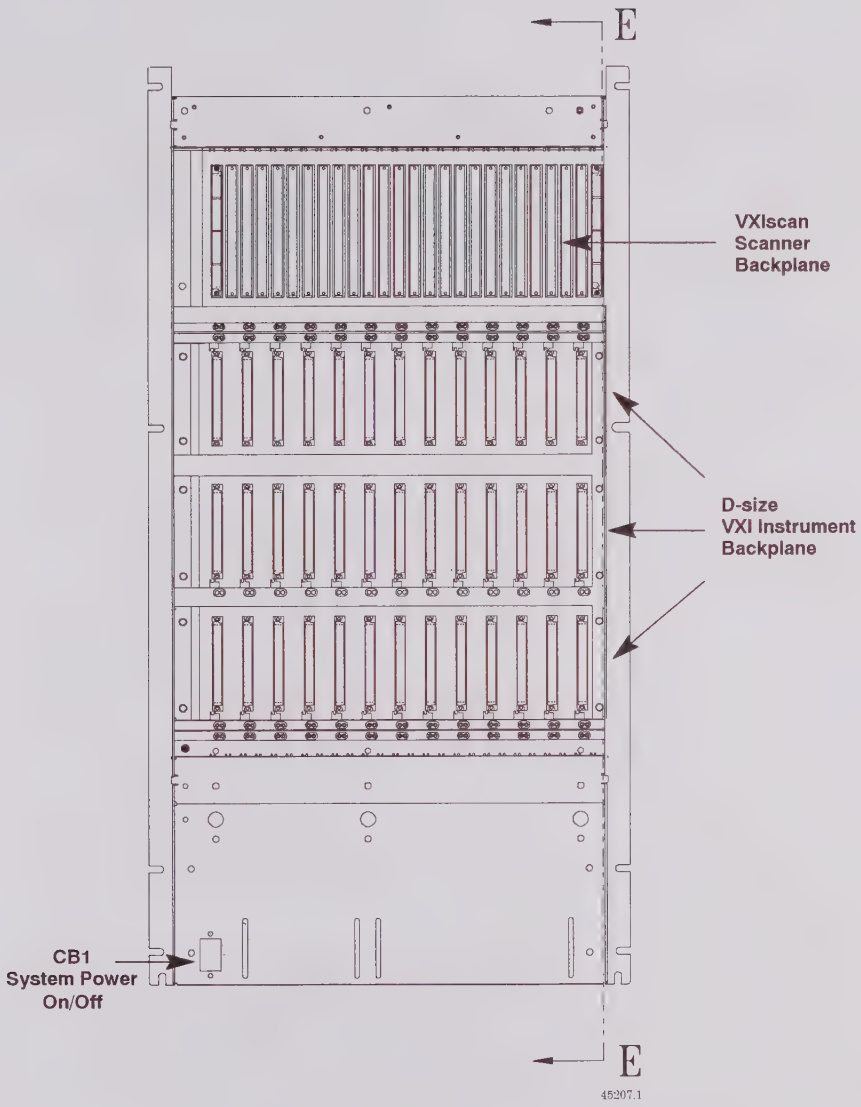


Figure 1–7 GR4000 Front View

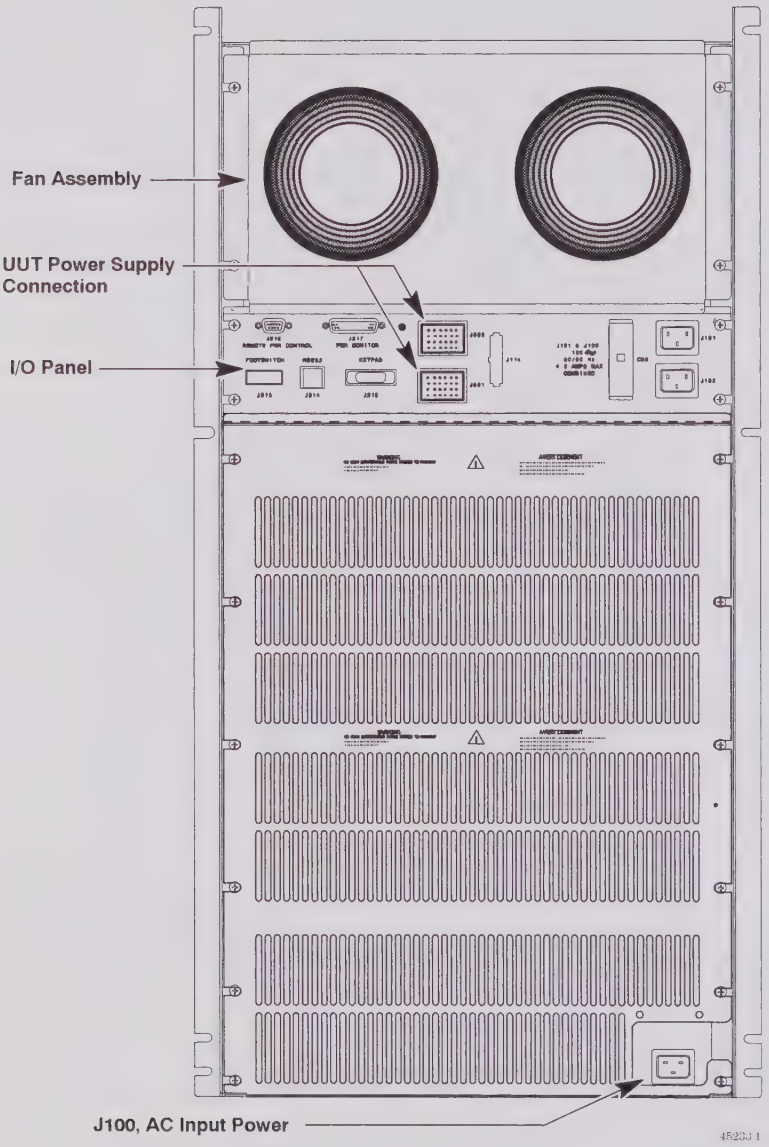


Figure 1–8 GR4000 Rear View

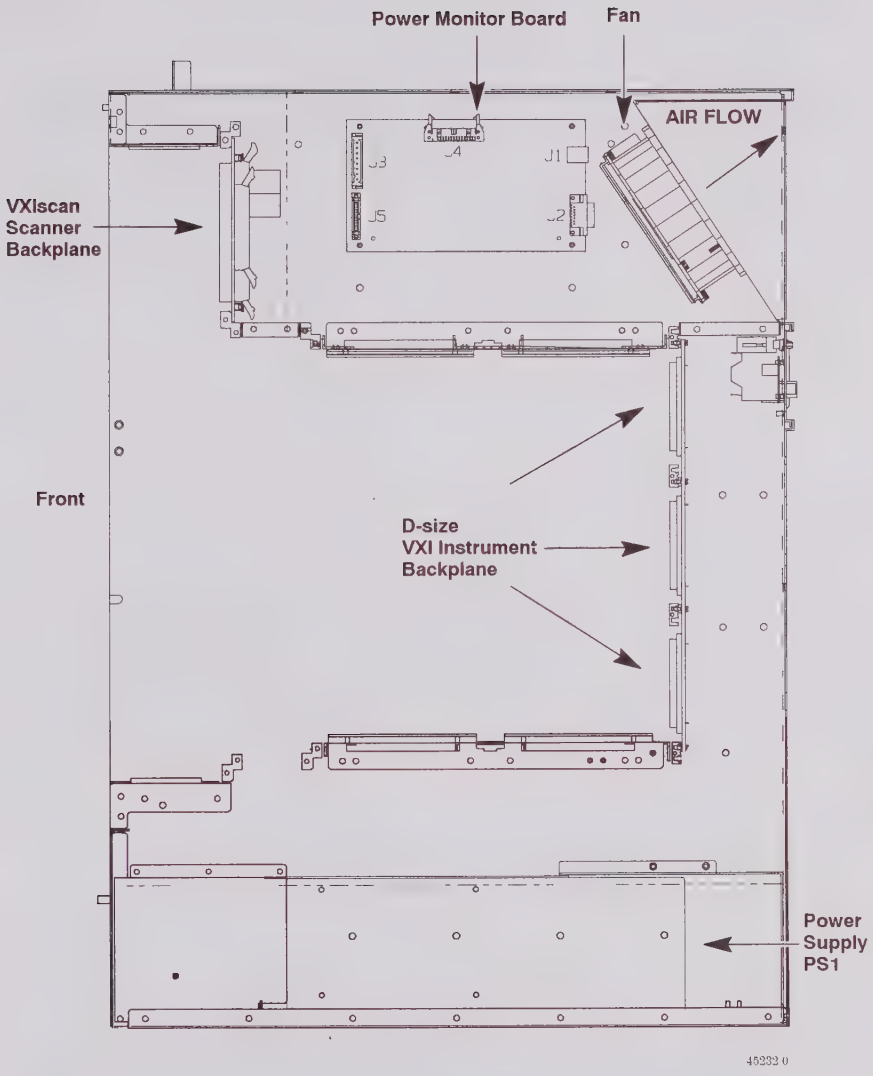


Figure 1–9 GR4000 Right Side View - Section E-E

System Power

Power supply PS1 provides DC power to the instrument and scanner backplanes, the power monitor board, and the system cooling fans. Refer to Table 1–2 to locate the drawings with the system power supply location for your system. Refer to Chapter 6 for a listing of the DC power outputs.

Table 1–2
PS1 Locations

System	Figure
GR1000*e*	Figure 1–3
GR2000	Figure 1–6
GR4000	Figure 1-12

UUT Power Supplies and Controller

The system may contain the optional programmable power supplies that provide power for the unit-under-test (UUT). The UUT power supply cage contains the UUT power supplies and the UUT power supply controller. The UUT power supply controller controls the operation of the power supplies in this cage with signals received from the PC via an IEEE-488 interface. The UUT power supply controller resides in slot 0 of the controller cage. Cage slots 1 through 7 accommodate up to seven power supplies with one power supply per slot. Any combination of these power supplies can be installed in this cage.

The power supply outputs are cabled to the receiver power block. The three different types of programmable UUT power supplies are:

- 0 to 7 V at 15 A
- 0 to 20 V at 8 A
- 0 to 60 V at 2.5 A

NOTE The maximum total UUT power output is 1000 watts. The UUT power supplies require the optional power distribution unit (PDU).

I/O Panel

This panel is located on the rear of the system as shown in Figure 1–2 for the GR1000*e*, in Figure 1–5 for the GR2000, and in Figure 1–8 for the GR4000. Refer to Figure 1–10 for a detailed view of the 120V version of this panel for the GR1000*e*.

Refer to Figure 1–11 for a detailed view of the 120V version of this panel for the GR2000, and GR4000. The AC voltage at receptacles J101 and J102 is the same as the system input voltage. System markings by these receptacles indicate the available AC voltage and current. The devices connected to these receptacles are:

- J101: PC
- J102: Printer

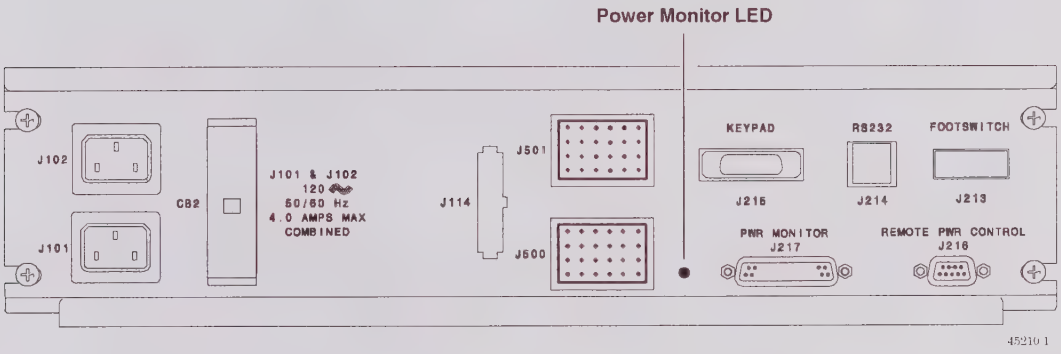


Figure 1–10 GR1000*e* I/O Panel for 120 V System

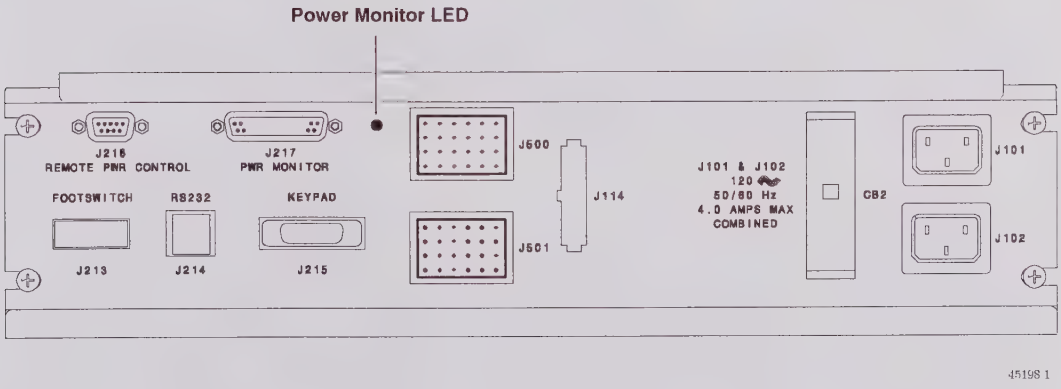


Figure 1–11 GR2000 and GR4000 I/O Panel for 120 V System

Circuit breaker CB2 is the AC protection device for J101 and J102. The total maximum current available from J101 and J102 is 4 amps at 120 V or 2 amps at 200-240 V. Table 1–3 shows the remaining I/O connector functions.

Table 1–3
I/O Panel Connections

Connector	Function
J114	Optional ring generator
J213	Optional footswitch cable connection
J214	RS232 serial port for the optional keypad and footswitch connections to the PC (COM6)
J215	Optional keypad cable connection
J216	Power distribution or vacuum controller unit remote control power (+24V)
J217	Power monitor board connection to the PC (COM5)
J500	Optional UUT power supplies
J501	Optional UUT power supplies

System Interconnect Diagrams

The preceding figures show the physical layout of the GR1000*e*, GR2000, and GR4000, and the major system subassemblies. The diagrams in Appendix B show the electrical interconnections between these subassemblies, external I/O devices, and the PC.

Power Monitor Board

The power monitor board is mounted on the left side of the system as shown on page 1-5 for the GR1000*e*. The power monitor board is mounted on the right side of the system as shown on page 1-8 for the GR2000, and on page 1-11 for the GR4000. This board monitors all PS1 DC output voltages, fan operation, and ambient temperature sensors in the system. The power monitor uses a RS-232 serial line to communicate with the PC via J217.

Operator Control Keypad

The optional operator keypad is used to call and run test programs. Each key transmits a unique ASCII character to the PC at 9600 bps using the RS-232 protocol. Each LED is turned off or on with a unique ASCII character received from the PC. On power-up, no LEDs should be lighted.

The keypad assembly consists of the keypad and its cable. One end of the cable is hard-wired to the keypad. The other end of the cable connects to keypad connector J215 on the I/O panel. The keypad uses 0.5A @ +5V DC.

Control Function Footswitch

The optional footswitch performs the same start/continue function as one of the keys on the control keypad. The footswitch is cable-connected to connector J213 on the I/O panel. To function, the footswitch requires the keypad to be connected to the system.

Keyboard

The keyboard enables the operator to enter commands and data into the system and to edit test programs. The CRT monitor's cursor and other display functions are controlled from the keyboard.

Line Printer

The Okidata [1] Microline 320 printer is generally used to print test program files. Printer ribbon can be obtained from GenRad as PN 1790-4105 or from Okidata. Paper is $9^1/_2 \times 11$ inches, fan-folded, $^1/_2$-inch vertical perforated left and right, 1000 continuous sheets per box, and is available from computer paper suppliers.

Ethernet Connection

The Ethernet interface, located in the PC, provides external connection to either a thin-wire, thick-wire, or twisted pair network for data exchange. The user is responsible for the purchase and installation of the Ethernet transceiver and related cables.

Bar Code Reader

The optional bar code reader allows you to quickly and accurately scan a UUT serial number. The GenRad part number for the Caere Model 1021 Bar Code Reader is 9021-0118-00.

System Computer

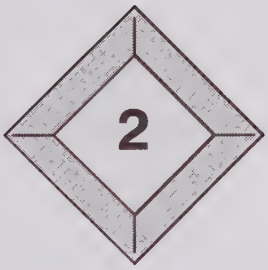
A number of different PCs may be used as the system computer. A DMCC Pentium II PC is used as one of the examples in this manual. This high-performance PC provides the speed and capabilities required for demanding I/O transfers. GenRad-selected PC interface boards and related PC peripherals offer a wide variety of performance to meet the most stringent test criteria. The PC performs the following functions:

- Displays test results and prompts on the video monitor
- Allows the operator to write, edit, and store programs for testing the unit-under-test (UUT)
- Allows the operator to control UUT test operations with the keypad
- Communicates hard copy test results using the printer
- Retrieves stored test programs for system test operation
- Selects the test instruments to perform the programmed tests and measurements on the UUT
- Communicates with the power monitor board

Refer to *GENEVA PC Configuration Manual* and Chapter 2 for additional PC technical information and data.

1. Okidata Corp., Mt. Laurel, NJ 08054

Installation



Introduction

This chapter describes how to install the GR1000*e*, GR2000, and GR4000 test systems shipped in an optional cabinet. This chapter includes instructions for unpacking, installing, and testing the system. These test systems are customer-installable. You should read this chapter prior to unpacking and installing the system. Perform the procedures in this chapter in the sequence presented.

⚠ **WARNING** **Do not perform the test system installation unless you have appropriate technical training and experience, are aware of the hazards regarding electrical shock, and have taken appropriate precautions to minimize the danger to yourself and other people. The following instructions are intended for use by qualified personnel only. Examples of qualified personnel are electricians, factory-trained customer personnel, or manufacturers' service personnel.**

The system is shipped in a single cardboard container with a cushioned wooden skid for a base. Several cardboard cartons contain other items shipped with the system: the PC, peripheral equipment, documentation set, and other optional equipment.

⚠ **WARNING** **The system is designed with inherent safety to the user. Do not operate this system in a manner not specified by the manufacturer. To do so may impair protection.**

Inspecting for Damage

Visually inspect the system and all other items included in the delivery for signs of any damage incurred during shipment. If you find any apparent damage, notify the freight carrier immediately, regardless of the external condition of the containers. Save all packing materials in their present condition until the carrier's agent has examined them.

You must originate the claim with the carrier. The carrier's agent can inform you of the proper procedure for filing a claim. You should then notify the GenRad Service Department. The GenRad District Service Manager determines any repair charges that result from shipping damage. You are responsible for collecting the repair charges from the carrier. (GenRad ships FOB Westford, MA).

Refer to the reverse side of the packing slip for more detailed information about reporting damage incurred during shipment. The packing slip is attached to the outside of the cardboard container that holds the system.

Locating Product Shipping Documentation

One of the cartons shipped with the system contains the software distribution binder. This binder contains several plastic inserts that hold the system's software distribution diskettes. This carton also includes the third party software product that the test system uses, and the product shipping documentation. The product shipping documentation contains a complete list of all of the items shipped to you.

Before unpacking the system, use the product shipping documentation to inventory all of the items that you received in the shipment.

NOTE Any optional instrument or scanner modules that you ordered are already installed in the system.

If any item listed in the product shipping documentation is missing, notify the GenRad District Service Manager to expedite delivery of the missing items.

Required Tools and Equipment

You can save valuable time at installation by obtaining the required tools and equipment prior to system delivery. The following tools and equipment (or their equivalents) are required for unpacking and installing the system:

- Fork lift with a 4 ft (1.2 m) fork, to move the system to the unpacking location
- Strap cutter
- Safety goggles (to wear when cutting straps)
- Cutters and long-nose pliers (for removing staples from the system shipping carton)
- Digital voltmeter
- Ratcheting socket wrench with socket for 1/4 in. (6.35 mm) hex-head bolts (for removing two hex-head lag screws from the shipping skid)
- Flat-blade screwdriver
- Phillips-head screwdriver, number 2

Moving the Test System

Use a forklift to move the shipping container to the area where you will install the system. At the installation site, make certain that the shipping container is centered in a working space that can accommodate the unloading ramps, the system when moved off of the skid, and a fork lift.

CAUTION **Locate the skid end marked LIFT THIS END ONLY before moving the system with a forklift. Insert the forks under the wooden skid only under this end of the shipping container.**

Unpacking the Test System

CAUTION **Do not use a hoist to lift the system from its wooden skid. When you use a fork lift, be sure to insert its fork directly under the skid.**

NOTE Save all packing materials including the wooden skid, cardboard container and ramps, and other cartons until you verify that your system is undamaged. You can use the packing material again for any future relocation of the system.

➤ To unpack the system

1. Locate and remove the packing slip. The packing slip is stored in a clear packet attached to the outside of the container sleeve.
2. Cut the strapping that secures the cardboard container to its wooden skid. Wear safety goggles.
3. Remove the staples along the four lower sides of the container sleeve. The staples are located in a horizontal row at the base of the sleeve just above the wooden skid.
4. Slit open the top of the cardboard container through the center area where it is taped.
5. Open the top of the cardboard container. Remove the two ramps and the cardboard/foam shipping spacer.
6. Lift the cardboard container sleeve up and over the system to remove it.
7. Remove the plastic cover that covers the system.
8. Inspect the system for any signs of damage that may have incurred during shipment. If you find any apparent damage, refer to page 2-1 and the reverse side of the packing slip for more information about reporting damage.
9. Remove one hex-head bolt from each end of the board that is located on the skid by the ramp unloading side where the ramps will be attached to the skid. Remove the wood board from the skid.
10. Remove two lag screws from each end of the board that is located on the skid by the ramp unloading side. Remove the wood board from the skid.
11. Insert the two ramps in their designated ramp skid holes. Each ramp has two pins that fit into two holes in the skid. Refer to Figure 2–1.

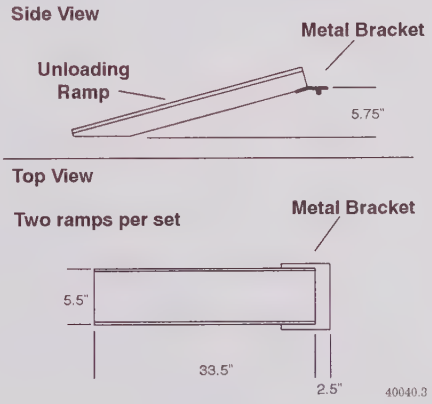


Figure 2–1 Unloading Ramps

12. Position the system's caster wheels in the direction that the system will be moved. This assists in a straight movement pattern when guided off the skid and down the ramps to the floor.

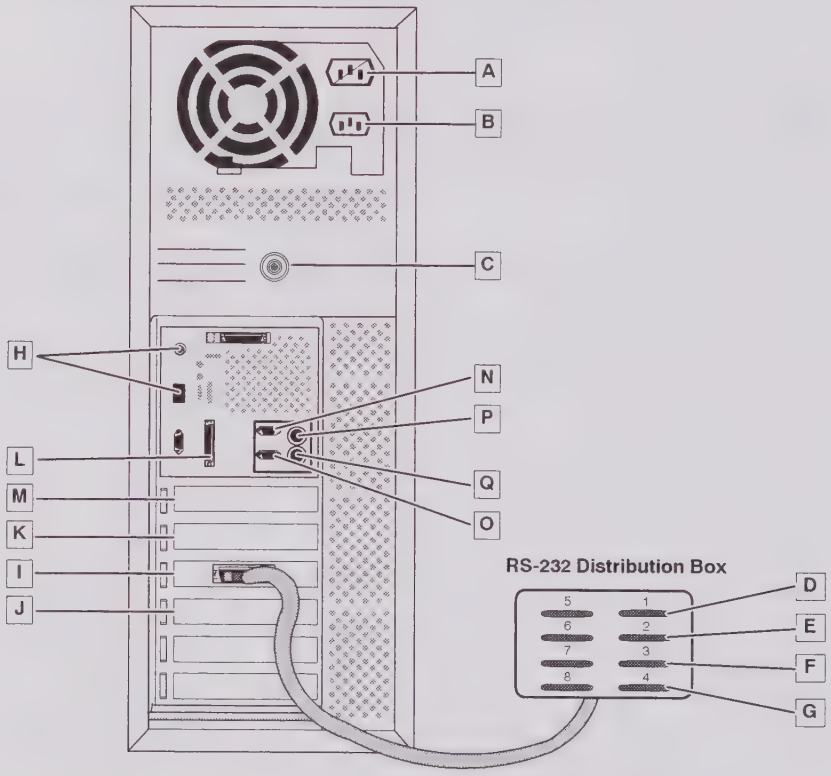
WARNING **Move the system from its skid with a minimum of two persons. Make certain that an adequate number of personnel are present to assist.**

13. Roll the system slowly off the skid and down the ramps to the floor.
14. Remove the ramps from the skid and store the skid, ramps, and all other packing materials for possible future use.

Installing the PC, Peripherals, and Cables

If the PC is a tower model, you can place it on the floor next to the system. If your system includes the programmer's table option, you can place the PC and its peripherals on this table.

CAUTION **The screw connections on the PC should only be finger tight. Do not over-tighten the screw connections. Figure 2–2 shows the screw connections on the rear of the PC.**



Legend

A AC Output Receptacle

B AC Power Input

C Chassis Key Lock

D COM 5 Serial Port (Power Monitor)

E COM 6 Serial Port (Keypad and Footswitch)

F COM 7 Serial Port (Automation or Battery Backup/UPS)

G COM 8 (not used)

H Ethernet Network Interface (Option)

I RS-232 Interface

J IEEE Interface

K AT-MXI Interface (Cable Connection to MTG Board)

L Parallel Printer Port

M SVGA Interface (Cable Connection to CRT Monitor)

N COM 1 Serial Port (Modem)

O COM 2 Serial Port (Strip Printer)

P Keyboard Port

Q Mouse Port

33163.0

Figure 2–2 Typical Prioris Pentium PC, Rear View

Figure 2–3 shows the rear of a typical 7-Slot Pentium II PC and indicates a general system configuration. Figure 2–4 shows the read of a typical 13 Slot Pentium II PC and indicates a general system configuration.

CAUTION **To prevent equipment damage, the 115/230 Voltage Select Switch at the rear of the PC must be set manually and correctly. Permanent damage could result if the switch setting does not match the system's input voltage.**

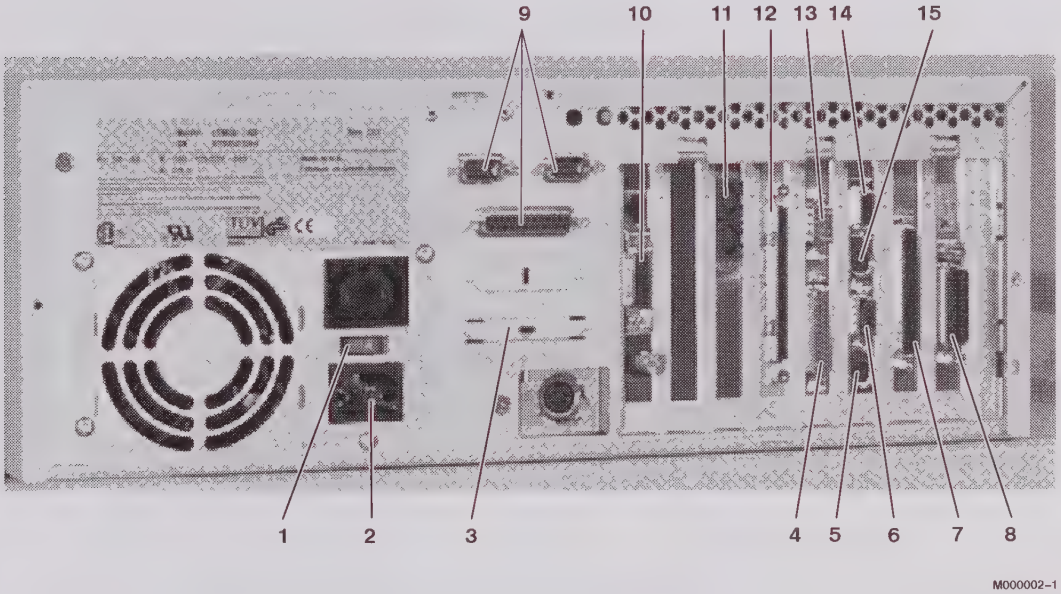


Figure 2–3 Typical 7-Slot Pentium II PC, Rear View

1	Voltage Select Switch	9	Not Used
2	Power In	10	Network Card
3	External SCSI Connector	11	Modem (Optional)
4	Parallel Port	12	HOSTESS Card
5	PS/2 Keyboard	13	COM2
6	COM1	14	Monitor
7	MXI	15	PS/2 Mouse
8	GPIB		

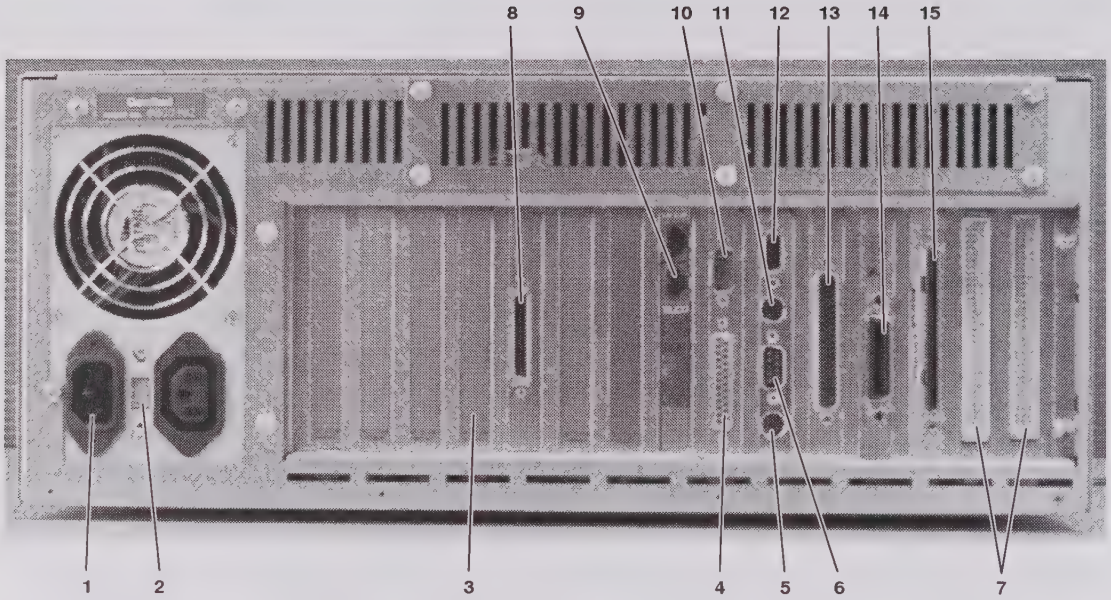


Figure 2–4 Typical 13-Slot PC, Rear View

1	Power In	9	Modem (Optional)
2	Voltage Select Switch	10	COM2
3	Reserved for Network Interface Card	11	PS/2 Mouse
4	Parallel Port	12	Monitor
5	PS/2 Keyboard	13	MXI
6	COM1	14	GPIB
7	IOP Handler Interface	15	HOSTESS Card
8	External SCSI Connector		

Remove the PC and manuals from the shipping carton. Follow these installation procedures for the PC, the peripherals, and interface cables.

NOTE J101, and J102 on the VXIcage I/O Panel are dedicated for the PC, monitor (CRT), and printer. If additional boards and peripherals are added to the PC, the current drawn by these items plugged into J101 and J102 cannot exceed the 4 amp limit.

➤ To install the MXI Cable

1 Locate the MXI cable that exits the rear of the system.

2 Connect this cable to the MXI interface connector on the rear of the PC.

➤ To install the RS-232 Distribution Box

1 Locate this box with its attached cable.

2 Connect the attached cable to the RS-232 connector port on the PC.

➤ To install the Power Monitor Cable

1 Locate the parallel 25-pin D connector cable, PN 9021-0258-00.

2 Connect one end of the cable to the RS-232 distribution box connector marked 1 (COM5).

3 Connect the other end of the cable to J217 on the system's I/O panel.

➤ To install the Ethernet Cable

1 Connect the Ethernet cable, if present, to the Ethernet network interface connector on the rear of the PC.

2 Connect the other end of this cable your Ethernet network. The user is responsible for the installation of the optional Ethernet transceiver and related cables.

➤ To install the IEEE Interface Cable for UUT Power Supplies

1 Locate the IEEE interface cable, PN 1765-6019, that is connected to the AT-GPIB connector on the UUT power supply controller module. This cable is routed from the UUT power supply controller module to the rear of the system.

2 Connect the unconnected end of this cable to the IEEE interface connector on the PC.

➤ To install the Keyboard and optional Bar Code Reader

1 Remove the keyboard from its shipping carton and place it on the table near the PC.

2 If your system includes the bar code reader option, remove the bar code reader/cable assembly from its shipping carton and place it on the table near the PC.

3 Connect the bar code reader cable to the keyboard port on the PC.

4 Connect the keyboard's I/O cable to the connector on the bar code reader cable, if present, or to the keyboard port on the PC.

➤ To install the Mouse

1 Remove the mouse from its shipping carton and place it on the top of the table by the keyboard.

2 Connect the mouse's I/O cable to the mouse port on the PC.

➤ To install the PC AC Power Cord

1 A separate IEC power cord is provided. Locate the IEC power cord, which is included with the system cable set.

NOTE Do not use the PC power cord that is enclosed in the PC carton.

2 Install the IEC power cord in the AC input location on the rear of the PC.

3 If this system does not include the 3 phase power controller option, plug the other end of the AC power cord into J101 on the rear I/O panel of the system's VXIcage. If the 3 phase controller option is in this system, plug the other end of the AC power cord into J107A of the 3 phase controller.

NOTE The GENEVA systems can be provided with optional 13 slot computers. Because of increased power requirements, these computers must not be plugged into JI01 or JI02 on the I/O panel on the back of the system's card cage. These must be plugged into a separate AC outlet external to the system. The available current must be at least 11.4 Amps at 120 VAC and 6.3 Amps at 240 VAC.

4 Verify the Voltage Select Switch matches the supply level.

CAUTION To prevent equipment damage, the 115/230 Voltage Select Switch at the rear of the PC must be set correctly. Permanent damage could result if the switch setting does not match the system's input voltage.

➤ To install the CRT Monitor

1 Remove the CRT monitor from its shipping carton and place it on top of a table.

2 Connect one end of the CRT monitor's I/O cable to the SVGA interface port on the PC. Connect the other end of this cable to the I/O port on the rear of the CRT monitor.

3 If this system does not include the 3 phase power controller option, plug the other end of the AC power cord into the AC outlet on the rear of the PC. If the 3 phase power controller option is in this system, plug the other end of the AC power cord into J107B of the 3 phase power controller.

➤ To install the Line Printer

NOTE If your system includes the serial line printer option, remove the printer from its shipping carton and place it on the top of a table.

1 Locate the line printer's I/O cable, PN 9021-0054.

2 Connect one end of the line printer's I/O cable to the serial I/O port on the rear of the printer.

3 Connect the other end of this cable to the PC's COM2 serial port.

4 Set the printer's power switch to its off position.

5 If this system does not include the 3 phase power controller option, plug the other end of the AC power cord into J102 on the rear I/O panel of the system's VXIcage. If the 3 phase power controller option is in this system plug the other end of the AC power cord into J107C of the 3 phase power controller.

NOTE Refer to the *Okidata Microline 320/321 Setup Guide* (packaged in the printer carton) for installation and setup instructions.

Table 2-1
Location of AC Cords for 3 Phase Power Controller

Device	Jack
PC	J107A
Monitor	J107B
Printer	J107C

➤ To install the Keypad (Option)

1 If your system includes the keypad option, remove the keypad/cable assembly from its shipping carton.

2 Lay the keypad/cable assembly on the top of the table near the PC.

3 Connect the keypad's cable connector to KEYPAD connector J215 on the I/O panel on the rear of the system.

4 Insert one end of the RJ45 cable into connector J214 on the I/O panel. Connect the other end of the RJ45 cable to the RS-232 distribution box connector marked 2 (COM6), using the filter connector and the RJ 45 to DB25 adaptor as shown in Figure 2-5.

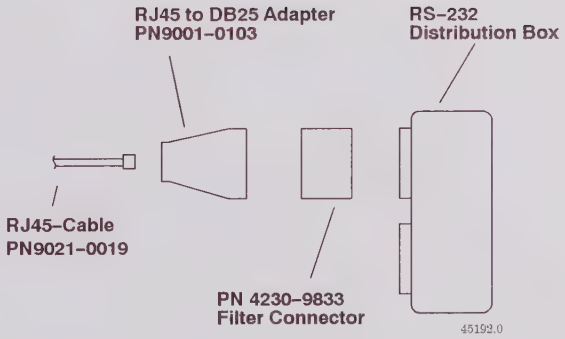


Figure 2-5 RJ45 to RS-232 Connection

➤ To install the Footswitch (this option requires that the Keypad be attached)

1 Locate the carton that contains the footswitch/cable assembly and remove the assembly.

2 Connect the footswitch cable connector to FOOTSWITCH connector J213 on the I/O panel on the rear of the system.

System Power Cord Installation

The system's AC input power requirements must conform to the specifications described in the *GR1000e, GR2000, GR4000 Site Preparation Guide* in addition to your local and country electrical codes.

There are three different power configurations that your system can be set to.

- Standard Modular System with no Power Distribution Units
- Standard Modular System with Single Phase Power Distribution Units
- Standard Modular System with a 3 Phase-Power Distribution Unit

Standard Modular System with no Power Distribution Units

Only one AC input cord needs to be plugged in for this configuration. This power cord emanates from the rear of the system's VXIcage chassis.

The country-specific, AC power cord plugs into J100 on the rear of the system. Figure 2–6 shows the J100 power pin variants.

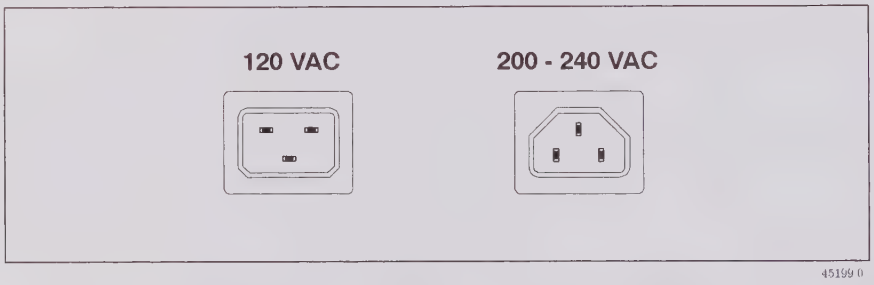


Figure 2–6 AC Input Power Connector Variants

GenRad offers AC input power cords with the plugs shown in Figure 2–7 for the modular GENEVA systems. If none of these power cords are compatible with the available power source, the customer must provide the appropriate power cord. Refer to Table 2–2.

Figure 2–7 AC Input Power Cords

CAUTION **Power cords and power source wiring must conform to local and country electrical and safety codes.**

Table 2–2
Input Power Requirements

Requirements	120 VAC †	200 - 240 VAC ††
Power	16A 50/60 Hz single phase 1920 VA maximum	8A 50/60 Hz single phase 1920 VA maximum
Power Cord Rating	125V 20A minimum	250V 10A minimum
System end connector	IEC 320 C19	IEC 320 C13
Power source end plug	NEMA 5-20P	††
Customer-provided receptacle	NEMA 5-20R	††

† 20 A service requirements

†† Country dependent service requirements

NOTE Allow sufficient lead time for the delivery of the power receptacle and associated cabling to insure the site power is ready for system delivery.

This product is intended for installation in accordance to IEC 664, Installation Category II. This category indicates that this product is designed for use at the local level and refers to the local power distribution within your building.

Standard Modular System with One or More Single Phase Power Distribution Units

With this configuration, you need to plug-in one AC power cord for the System and one for each of your Single Phase Power Distribution Units (PDU).

CAUTION **Do not plug the VXIcage power cord into the PDU. Some systems may contain the optional Power Distribution Unit (PDU). The PDU is designed to control AC power to the UUT power supplies or other rack-mounted instruments.**

For installing the System AC power cord(s), refer to page 2-8.

To install the Single Phase PDU power cord(s), refer to Figure 2–8 through Figure 2–11.

100 - 120V Input Power Connections

The 100 - 120V model requires a 100 to 120V single phase input power service with 2 wires plus safety ground, 50/60 Hz, 30A minimum. Earth ground to neutral voltage must not exceed 5V rms and is typically 0V. The 15 ft (4.57 m) input power cable is terminated with a Hubbell 330P4W, or Hubbell 2611, (or equivalent) 2-pole, 3-wire grounding plug, shown in Figure 2–8. The mating receptacle (Hubbell 330R4W, or Hubbell 2610A or equivalent) should be installed by the customer prior to system delivery. Refer to Figure 2–9 for the correct receptacle wiring.

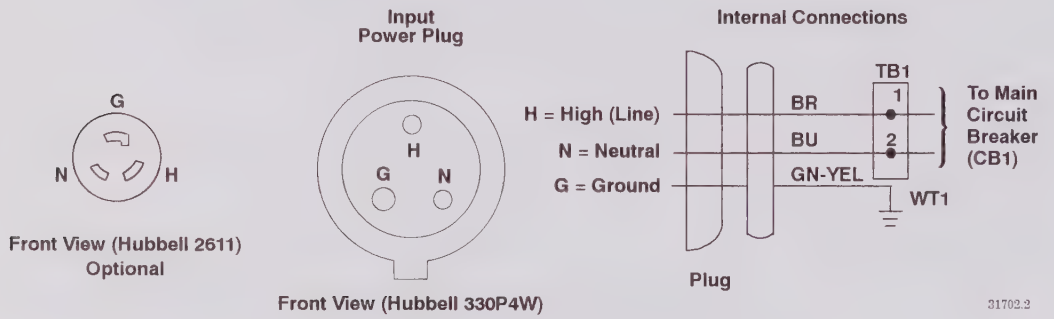


Figure 2–8 120V Single Phase Plug Wiring

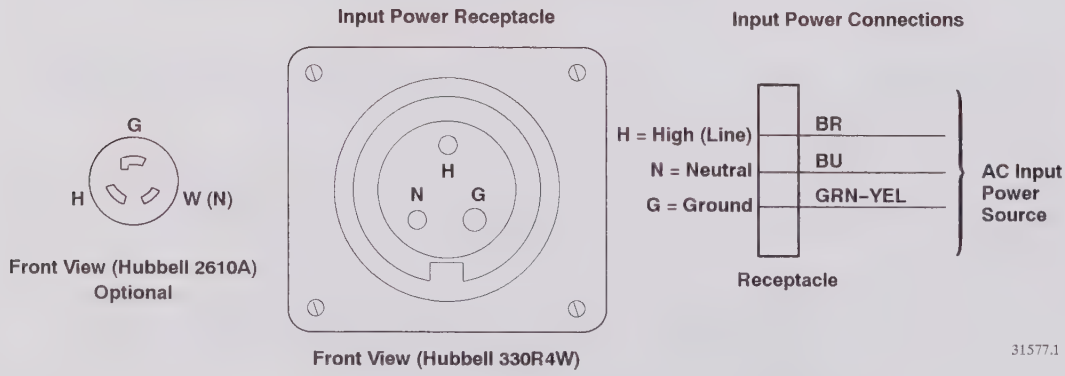


Figure 2–9 120V Single Phase Mating Receptacle Wiring

200 - 240V Input Power Connections

The 200 - 240V model requires a 200 to 240V single phase input power service with 2 wires plus safety ground, 50/60 Hz, 16A minimum. Earth ground to neutral voltage must not exceed 5V rms and is typically 0V. The 15 ft (4.57 m) input power cable is terminated with a Hubbell 316P6W (or equivalent) 2-pole, 3-wire grounding plug, shown in Figure 2–10. The mating receptacle (Hubbell 316R6W or equivalent) should be installed by the customer prior to system delivery. Refer to Figure 2–11 for the correct receptacle wiring.

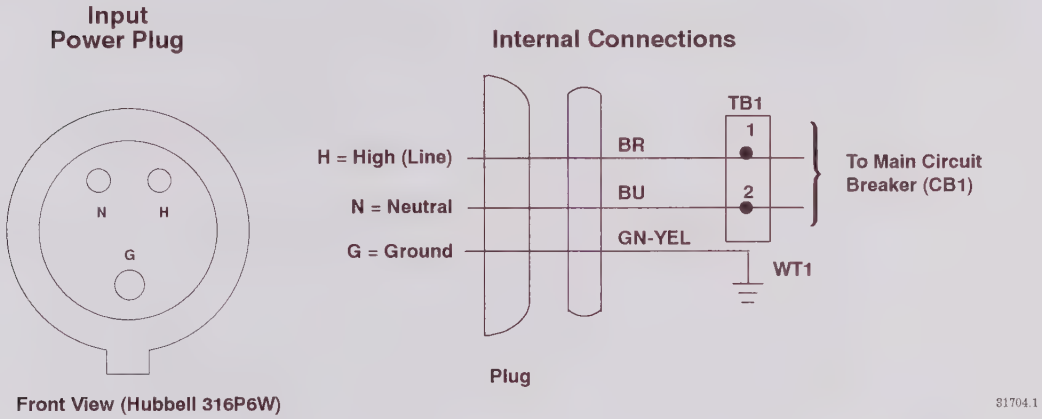


Figure 2–10 200 to 240V Single Phase Plug Wiring

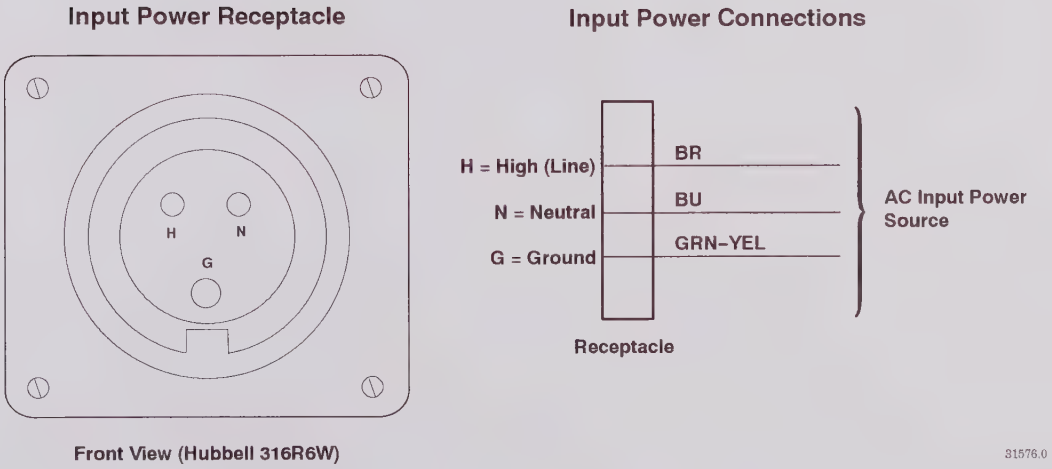


Figure 2–11 200 to 240V Single Phase Mating Receptacle Wiring

Standard Modular System with a 3 Phase Power Distribution Unit

Only one AC input power cord needs to be plugged in for this configuration. This power cord emanates from the 3 Phase Power Controller.

Four input voltage versions are available. Each version is listed along with a brief description and its applicable input and current capacity requirements.

Version	Description
1	Required Service: 208/120 volt, 3 phase, 60 amperes per phase. The maximum controller rating for this version is 48 amperes per phase. The main circuit breaker/main system disconnect switch is rated at 50 amperes.
2	Required Service: 208/120volt, 3 phase, 30 amperes per phase. The maximum controller rating for this version is 24 amperes per phase. The main circuit breaker/main system disconnect switch is rated at 30 amperes.
3	Required Service: 380-415/220-240 volt, 3 phase, 32 amperes per phase. The maximum controller rating for this version will be 30 amperes per phase. The main circuit breaker/main system disconnect switch is rated at 30 amperes.
4	Required Service: 380-415/220-240 volt, 3 phase, 16 amperes per phase. The maximum controller rating for this version is16 amperes per phase. The main circuit breaker/main system disconnect switch is rated at 20 amperes.

NOTE Version 1 is available with the optional terminal block.

Controller Input Power Requirements

WARNING **To avoid shock hazard, the system must be operated with an adequate earth ground.**

Wiring must conform to country and local electrical codes.

NOTE This product is intended for installation in accordance to IEC 664, Installation Category II. This category indicates that this product is designed for use at the local level and refers to the local power distribution within your building.

You can order the controller in the low voltage or high voltage AC input power configuration with a frequency of 50 or 60 Hz.

Table 2–3
Comparison of Low vs. High Voltage Configuration

Low Voltage Configuration	High Voltage Configuration
208/120 V, 3 Phase Wye (4 wires plus ground)	380–415 V/220–240 V, 3 Phase Wye (4 wires plus ground)
Range = 108 to 132 V (nominal of 120 V, phase to neutral)	Range = 198 to 264 V (nominal of 220, 230 or 240 V, phase to neutral)

The requirements for the plug, power cord, and the maximum loads allowable on a branch circuit for cord and plug utilization vary on a country-to-country basis. Install the system in accordance with all applicable codes for the system voltage configuration and installation location.

The AC input power source (and receptacle) for the system must be installed by the customer prior to system installation. Make certain that the receptacle connector that accepts the controller's plug meets the controller's voltage and current requirements. It is the customer's responsibility to procure and install the mating receptacle. The Hubbell* series of plug/receptacle connectors (specified in the following power configurations) comply with most country and local electrical codes.

* Harvey Hubbell, Inc., Wiring Services Division, Bridgeport, CT 06602, or Sager Electrical Supply, 60 Research Rd, Hingham, MA 02043, tel: (617) 749-6700.

208/120 VAC Input Power Configuration Range, 60A Required Service

With this configuration, the system requires 3 phase input power service in the range of 208/120 VAC wye connected, 4-wire plus safety ground, 50/60 Hz, 60 A per phase. The system is supplied with a 14.6 ft (4.5 m) power cable terminated with a Hubbell 560P9W (or equivalent) 4-pole, 5-wire grounding plug. Refer to Figure 2–12 which illustrates the power-plug wiring to the system's AC power cable. The mating receptacle (Hubbell 560R9W or equivalent) is to be procured and installed by the customer prior to delivery of the system. Refer to Figure 2–13 for the correct input plug wiring. Refer to Figure 2–14 for the correct receptacle wiring.

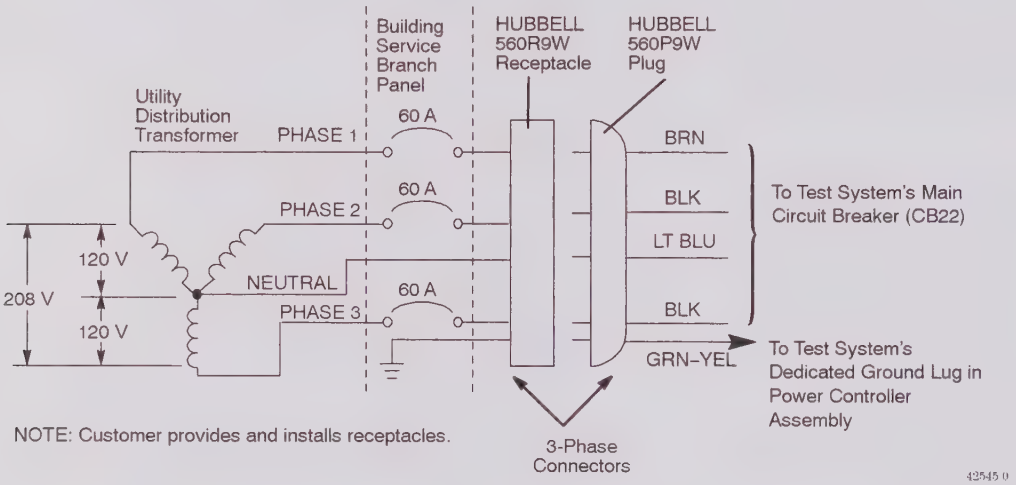


Figure 2–12 208/120 Volt 3 Phase Wye Connections

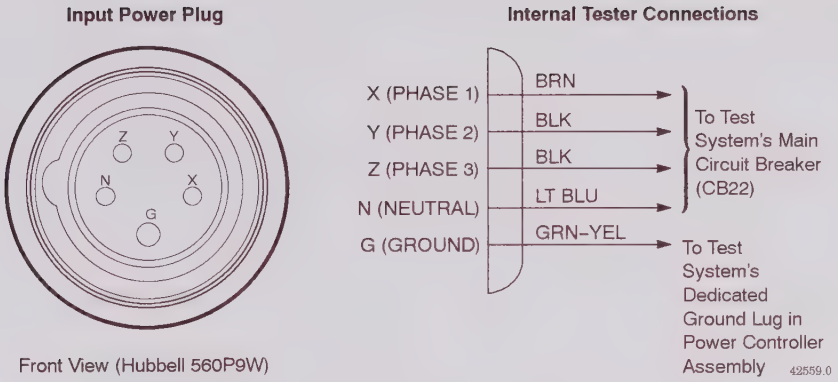


Figure 2–13 Wiring of Input Power Cable Plug

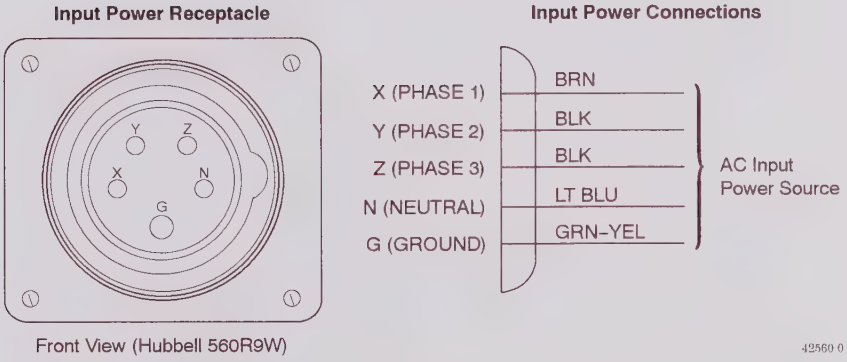


Figure 2–14 Wiring of Mating Receptacle for Input Power Cable Plug

208/120 VAC Input Power Configuration Range, 30A Required Service

With this configuration, the system requires 3 phase input power service in the range of 208/120 VAC wye connected, 4-wire plus safety ground, 50/60 Hz, 30A per phase. The system is supplied with a 14.6 ft (4.5 m) power cable terminated with a Hubbell 530P9W (or equivalent) 4-pole, 5-wire grounding plug. Refer to Figure 2–15 which illustrates the power-plug wiring to the system's AC power cable. The mating receptacle (Hubbell 530R9W or equivalent) and angle box are to be procured and installed by the customer prior to delivery of the system. Refer to Figure 2–16 for the correct input plug wiring. Refer to Figure 2–17 for the correct receptacle wiring.

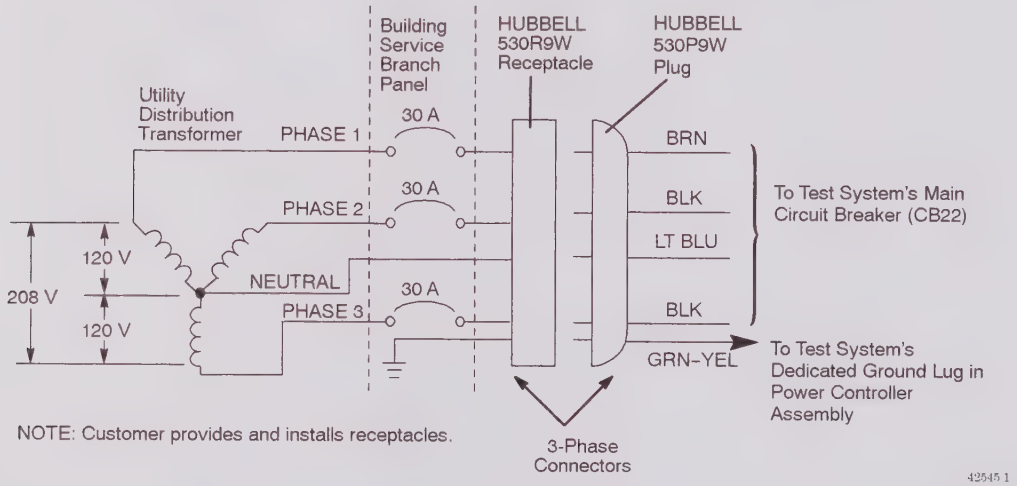


Figure 2–15 208/120 Volt 3 Phase Wye Connections

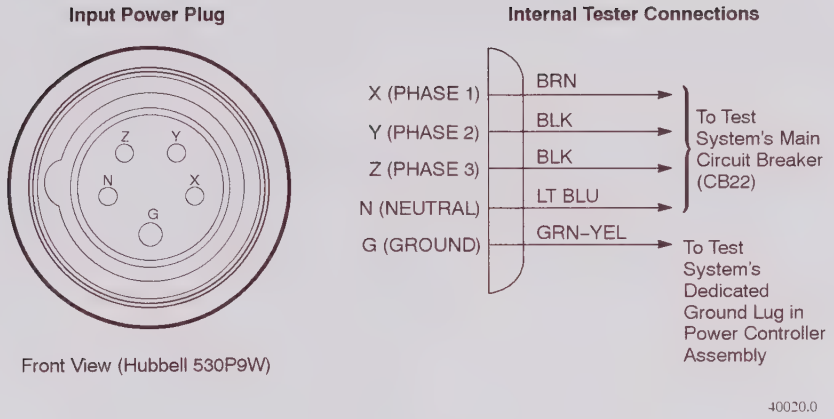


Figure 2–16 Wiring of Input Power Cable Plug

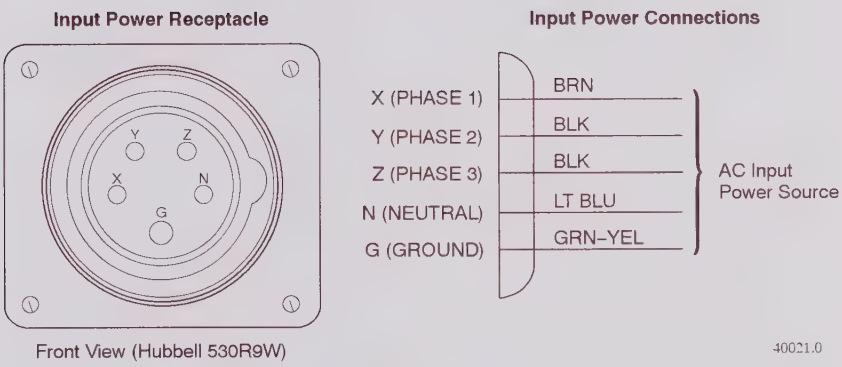


Figure 2–17 Wiring of Mating Receptacle for Input Power Cable Plug

380-415/220-240 VAC Input Power Configuration Range, 32A Required Service

This configuration of the system requires 3 phase input power service of 380-415/220-240 VAC wye connected, 4-wire plus safety ground, 50/60 Hz, 30A per phase. The system is supplied with a 14.6 ft (4.5 m) power cable terminated with a Hubbell 532P6W (or equivalent) 4-pole, 5-wire grounding plug. Refer to Figure 2–18 which illustrates the power-plug wiring to the system's AC power cable. The mating receptacle (Hubbell 532R6W or equivalent) and angle box are to be procured and installed by the customer prior to system delivery. Refer to Figure 2–19 for the correct input plug wiring. Refer to Figure 2–20 for the correct receptacle wiring.

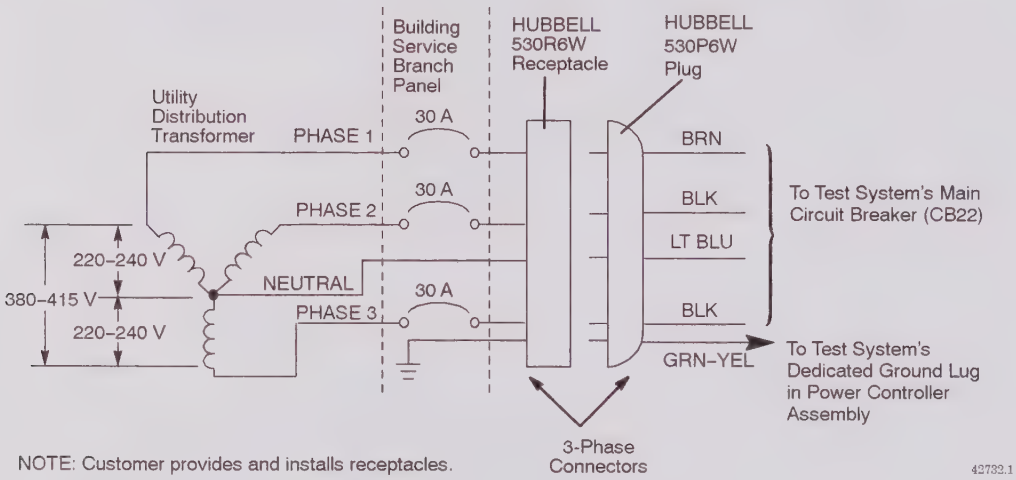


Figure 2–18 380–415/220–240 Volt 3 Phase Wye Connections

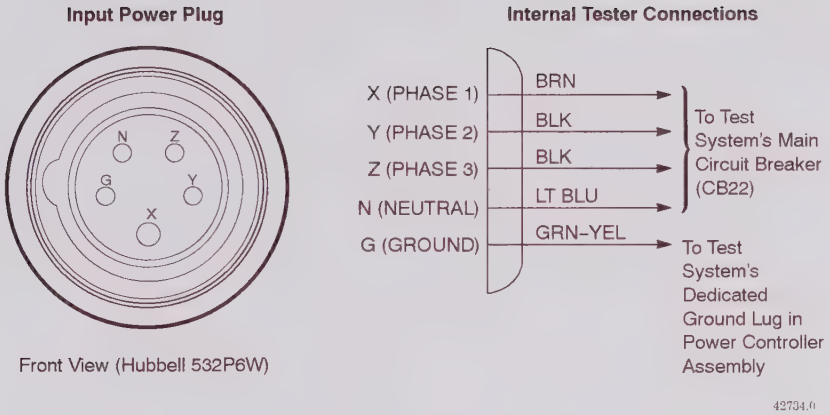


Figure 2–19 Wiring of Input Power Cable Plug

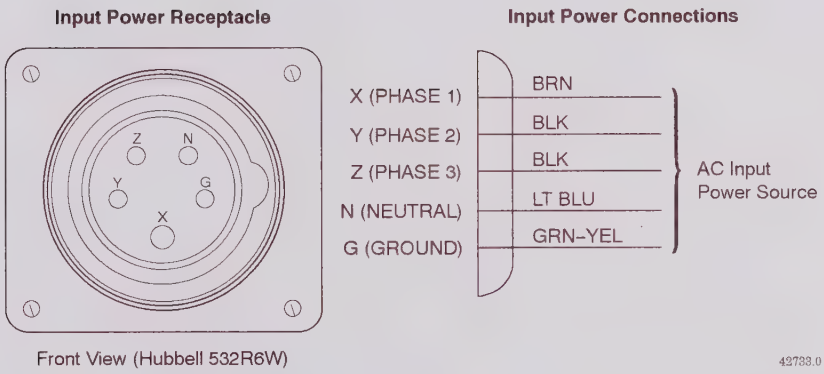


Figure 2–20 Wiring of Mating Receptacle for Input Power Cable Plug

380-415/220-240 VAC Input Power Configuration Range, 16A Required Service

This configuration of the system requires 3 phase input power service of 380-415/220-240 VAC wye connected, 4-wire plus safety ground, 50/60 Hz, 16A per phase. The system is supplied with a 14.6 ft (4.5 m) power cable terminated with a Hubbell 516P6W (or equivalent) 4-pole, 5-wire grounding plug. Refer to Figure 2–21 which illustrates the power-plug wiring to the system's AC power cable. The mating receptacle (Hubbell 516R6W or equivalent) and angle box are to be procured and installed by the customer prior to system delivery. Refer to Figure 2–22 for the correct input plug wiring. Refer to Figure 2–23 for the correct receptacle wiring.

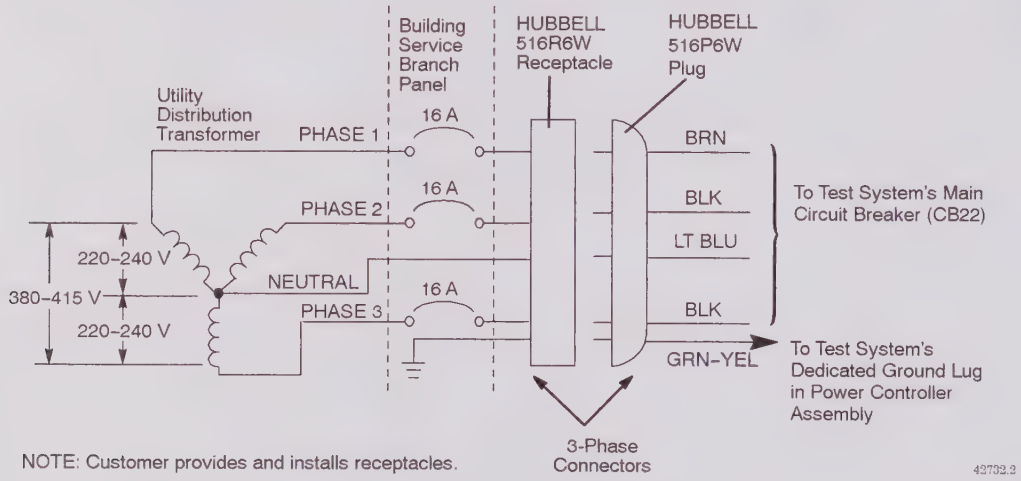


Figure 2–21 380–415/220–240 Volt 3 Phase Wye Connections

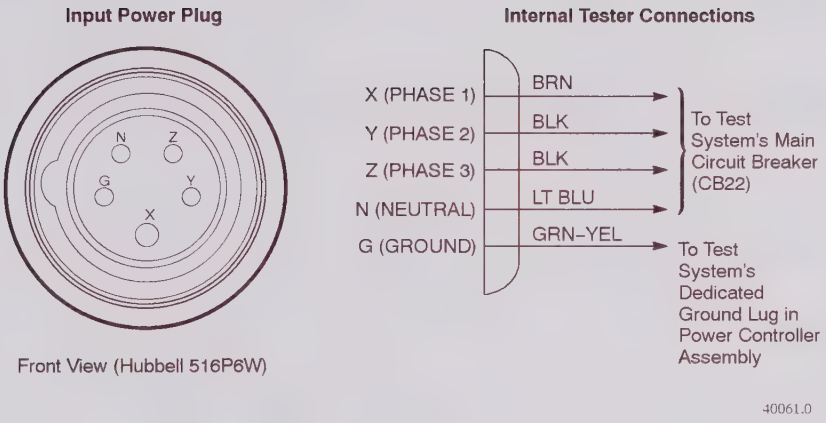


Figure 2–22 Wiring of Input Power Cable Plug

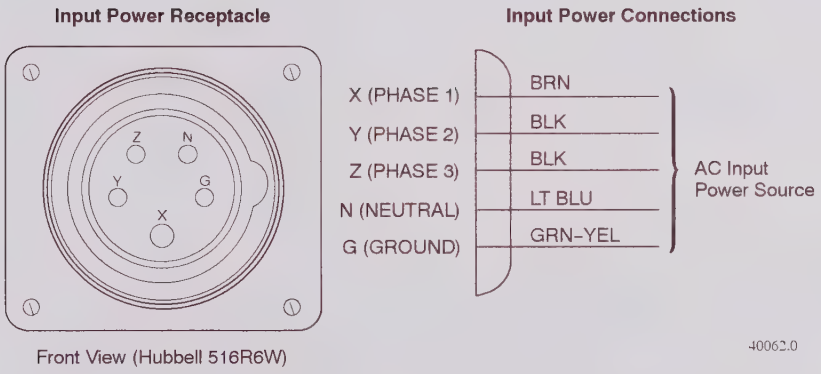


Figure 2–23 Wiring of Mating Receptacle for Input Power Cable Plug

Input Power Verification

CAUTION Verify that the AC power source receptacles are wired correctly prior to powering-up the system

Power Up and Checkout Procedure

➤ To power up the system and PC

1 For systems that do not contain a 3 Phase Power controller, switch on CB1 located on the front of the system's VXIcage chassis. Check to be sure that CB2 on the VXIcage's rear I/O panel is also turned on. If your system contains Single Phase PDUs, make sure that they are set to remote mode. (In remote mode these PDUs will turn on when the main system is turned on).

For systems with a 3 Phase Power controller, you will have to turn on both CB22 (main system power) and CB107 (PC and Monitor power)

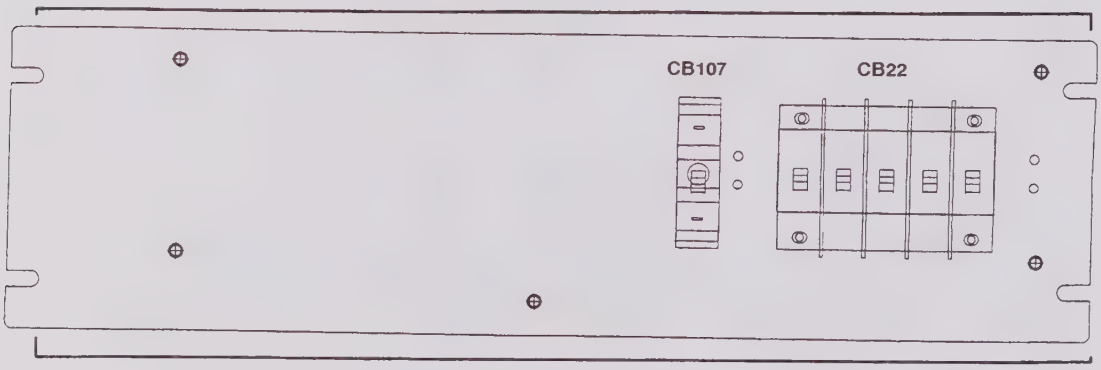


Figure 2–24 Front View of the 3 Phase Power Controller

2 Switch the CRT monitor On/Off switch to the ON position

3 Switch the PC power On/Off switch to the ON position

4 Verify that the System and PC fans are operating properly. If the System fans are not operating properly within 10 minutes, the power monitor board will shut down the system. Refer to Section 1 for more information about the Power Monitor Board.

The PC will automatically boot.

System Verification Tests

This section describes the procedure for verifying the modular GENEVA systems by running the operational verification programs (OVPs).

The GENEVA systems includes OVPs for the MXI scanner controller module and GenRad-manufactured scanner modules. There is also an OVP for the optional UUT power supplies. Refer to the *GENEVA Hardware Modules Manual* for the name of the OVP for each module.

If an error occurs while running an OVP, the error message displayed by the OVP identifies the fault and the module or other field replaceable unit (FRU) that failed. A qualified service technician can then replace the failed FRU.

Exterior System Cleanup

➤ To complete system installation

1 Install any panels and covers that were removed.

⊘ **CAUTION** **Do not clean the system with solvents such as acetone or methylethylketone. These solvents may damage the system paint or plastic.**

2 Clean the exterior of the system with a mild detergent solution and a soft cloth.

⊘ **CAUTION** **Be sure that the cloth is just slightly moist or water may get into the system, causing electrical problems. Be especially careful in the area of switches, receptacles, and connectors to be sure moisture does not seep into these items.**

3 Adjust the screw-type leveling feet to the floor to prevent the system from moving.

4 Give all system and peripheral manuals shipped with the system to the system site manager.

Preventive Maintenance

Introduction

The optimum performance and useful lifespan of the system depends on routine preventive maintenance. Failure to perform these procedures could result in the warranty being voided.

WARNING **Turn off the system power and disconnect the AC power plugs from its receptacle before performing any maintenance procedures.**

Cleaning the System

Perform the cleaning procedures described in the following sections.

CAUTION **Do not clean the system with solvents such as acetone or methylethylketone. These solvents can damage the system paint. Do not use any harsh abrasive, acidic or caustic cleaners on the system. These products will etch, corrode and discolor the paint.**

Cleaning the Exterior of the System

Operating personnel are expected to keep the system exterior clean. The system exterior can be cleaned with a mild detergent solution and a soft cloth.

CAUTION **Make certain that the cloth is just slightly moist or water may get into the system, causing electrical problems. Be especially careful in the area of switches, receptacles, and connectors to be sure moisture does not seep into these items.**

Cleaning the CRT Monitor

CAUTION **Make certain that the PC's power is off before applying any cleaner to the face of the CRT monitor.**

Clean the face of the CRT monitor using a small amount of glass cleaner and a soft cloth.

Air Filters

These sections describe the accessing and cleaning of the system air filters.

Accessing the Air Filters

➤ To access the air filters

1. Power down the system according to normal procedures.
2. Lower front air filter: Remove the lower front panel. A filter is attached to the inside of this panel.
3. Rear air filters: Remove the hardware that secures the rear panel. Two filters are attached to the inside of this panel.

Cleaning the Air Filters

These foam air filters must be cleaned whenever they are dirty enough to impede air flow. Since the amount of airborne contaminants varies from one site to another, specifying a fixed cleaning period is difficult. In general, if small clusters of dust are starting to collect on the filters, cleaning is necessary. As a minimum cleaning procedure, inspect all filters weekly and wash all filters monthly.

CAUTION **Turn off system power before removing filters to prevent dust from entering the system.**

➤ To wash the air filters

1. Pull the filter away from the Velcro fasteners with your fingers, being careful not to let any dirt and dust particles fall away.
2. Take the filter away from the system area. Knock off any dirt and dust large enough to fall free by its own weight. If an air gun is available, blow air into the outlet side of the filter. Or, if a vacuum cleaner is available, vacuum clean the inlet side of the filter.
3. Drop the filter into a sink containing warm, soapy water. Shake the filter in this solution several times until it is clean. Rinse well and squeeze out as much moisture as possible with paper towels. The filter will then be dry enough to prevent water drops from getting into the system. An air gun can also be used to dry the filter after washing.
4. Push the filter back against the Velcro fasteners.

For replacement filters, see the replacement parts list in Appendix A.

Preventive Maintenance Schedule

This schedule is a general guideline, based on 40-hour-per-week usage. More frequent maintenance may be necessary for increased usage and/or in areas with excessive contaminant and dust levels. Qualified site personnel are expected to perform only the weekly scheduled preventive maintenance (PM) procedures if the system is under warranty or included in a service contract.

Weekly

➤ To perform preventive maintenance procedures weekly

1 Run the system's OVP programs as specified in Chapter 5.

⊘ **CAUTION Make certain that system power is off before removing filters, to prevent dust from entering the system**

2 Inspect all air filters. Clean as specified in section.

⊘ **CAUTION Make certain that the PC's power is off before applying any cleaner to the face of the PC's CRT.**

3 Clean the face of the monitor's CRT using a small amount of glass cleaner and a soft cloth.

4 Inspect the printer for paper dust and vacuum when necessary.

Monthly

➤ To perform the following preventive maintenance procedures monthly

1 Perform all weekly PM.

2 Wash all air filters.

⚠ **WARNING Power down the system according to normal procedures.**

Quarterly

➤ To perform the following preventive maintenance procedures quarterly.

1 Perform all monthly PM.

2 Perform all printer PM, especially cleaning, as outlined in the manufacturer's manual.

Subsystem Removal and Replacement

WARNING To avoid personal injury and to prevent the risk of electric shock, do not perform any maintenance or servicing described in this manual unless you have appropriate technical training and experience to perform tasks in service areas of the equipment, and you are aware of hazards involved and how to minimize danger to yourself or other persons. These service instructions are for use by qualified service personnel only. Examples of such personnel are electricians and GenRad's or customer's factory trained personnel. Maintenance procedures that do not involve the use of tools for access inside the equipment may be performed by an operator.

Before removing any covers or otherwise exposing interior areas, turn the system's main power off.

For a non 3 Phase Power Controller system, you perform a system power down by turning off CB1 on the front of the system's VXIcage chassis.

For a system with the optional 3 Phase Power Controller, you perform a shutdown by shutting off CB22 on the front of the 3 Phase Power Controller. CB107 on the front of the 3 Phase controller controls power separately to J107 A, B, and C. These receptacles are used for the PC, PC Monitor, and Printer

When servicing the VXIcage power supply or the 3 Phase Power Controller, you should unplug the system from the wall by removing any and all AC power cords from their AC source.

CAUTION To prevent equipment damage, and for continued protection against fire, replacement fuses must be the same types and ratings as the originals.

Introduction

For a diagnosed failure requiring removal and replacement of a defective module or subassembly, follow the procedures described in this chapter. Refer to Appendix A for a list of field replaceable units (FRUs).

Static Sensitive Devices

A circuit board or module on which static-sensitive devices (MOS, CMOS, etc.) are mounted can be damaged if precautions are not taken when handling the board. Perform the following precautions when handling a static-sensitive circuit board or module:

- Ground yourself (static discharge connections are provided on each side of the system).
- Ground the frame of any test instrument or soldering iron to be used.
- If necessary, place the board on a grounded, conductive work surface.
- If a circuit board is to be stored or transported, enclose it in a conductive (anti-static) envelope.

Cable Connections

Tag a cable before disconnecting it to ensure correct reconnection. Make certain when reconnecting a cable that:

- Connector(s) are completely inserted and fully seated
- Any cable ties previously removed are replaced
- The cable is not crimped or twisted and is properly strain relieved

Scanner and Instrument Modules

CAUTION **Power monitor boards are static sensitive. To prevent damage to these boards:**

Use proper static sensitive precautions when handling the board.

Never place the board on the surface of the test system. If necessary, first place an ESD mat on the surface.

Two 9 in. long module extractors, PN 9002-0045, are required in the following procedures and are supplied with the system. Pressing the button at the top of the extractor operates a latch that releases the extractor. User-supplied or third-party instruments and scanners may not accommodate an extractor.

Refer to Figure 4–1 through Figure 4–3 for scanner and instrument slot numbering (as viewed from the front of the system).

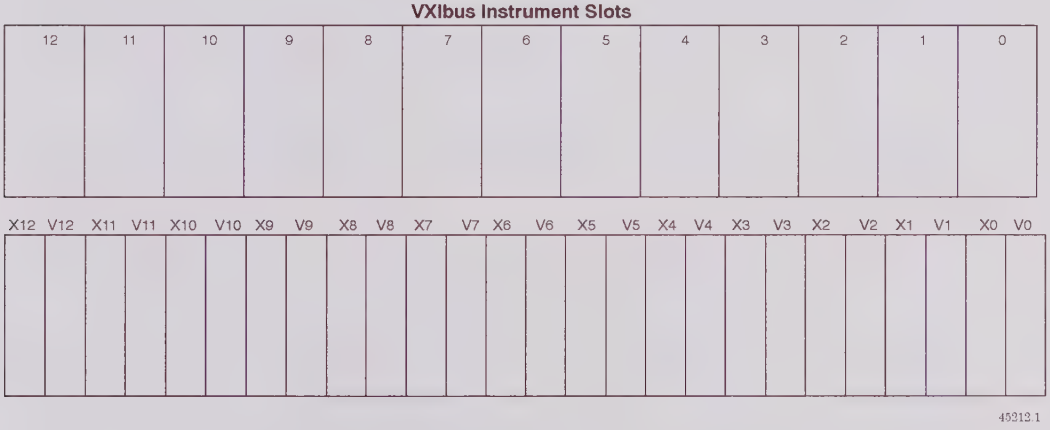


Figure 4–1 GR1000*e* VXIcage Slot Assignments

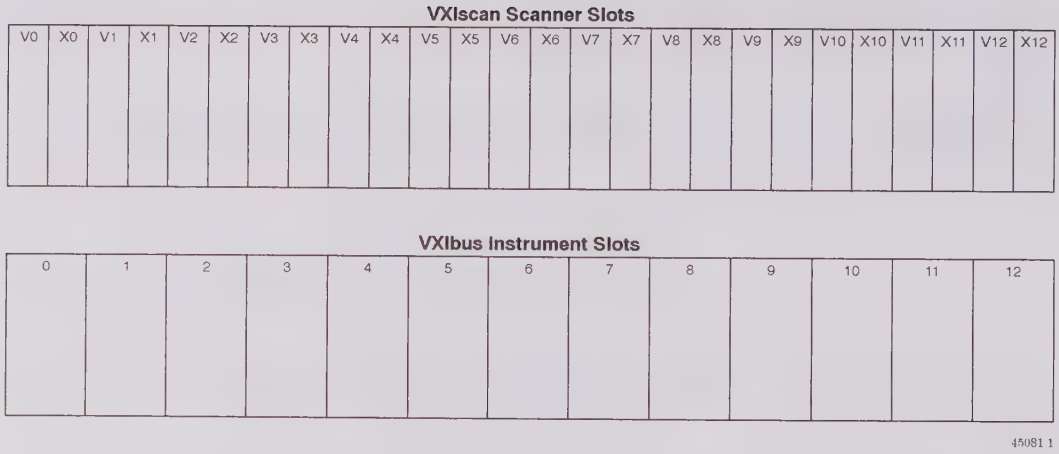

VXIscan Scanner Slots
V0 X0 V1 X1 V2 X2 V3 X3 V4 X4 V5 X5 V6 X6 V7 X7 V8 X8 V9 X9 V10 X10 V11 X11 V12 X12
VXIbus Instrument Slots
0 1 2 3 4 5 6 7 8 9 10 11 12
45081 1

Figure 4–2 GR2000 VXIcage Slot Assignments

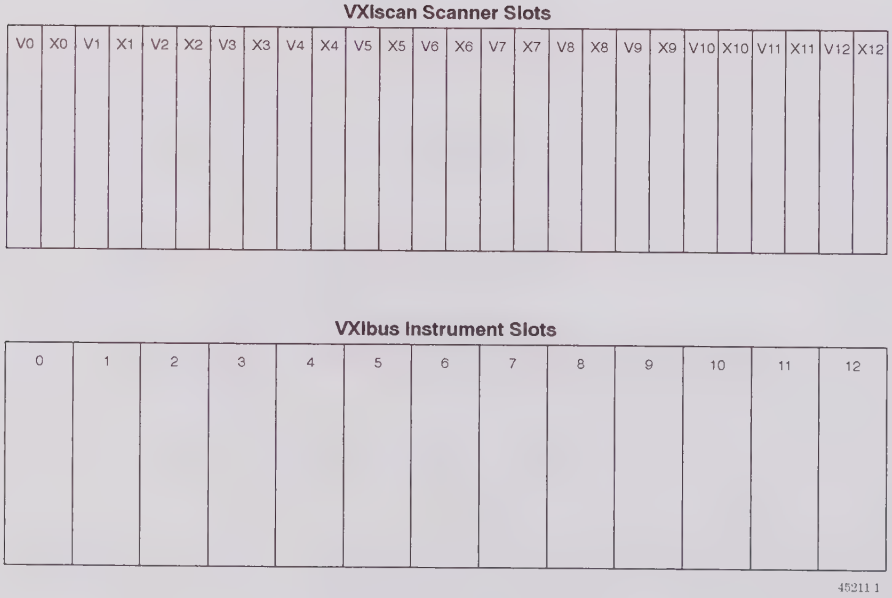

VXIscan Scanner Slots
V0 X0 V1 X1 V2 X2 V3 X3 V4 X4 V5 X5 V6 X6 V7 X7 V8 X8 V9 X9 V10 X10 V11 X11 V12 X12
VXIbus Instrument Slots
0 1 2 3 4 5 6 7 8 9 10 11 12
45211 1

Figure 4–3 GR4000 VXIcage Slot Assignments

Scanner Replacement

➤ To replace a scanner module

1. Turn the system's VXI cage power switch CB1 to its off position.
2. Remove the fixture/receiver assembly from the system.
3. Remove the front lower cover panel from the system.
4. Tag all cables, if any, that are connected to the scanner's external connector; then disconnect the cable connector(s) from the scanner.
5. Loosen the two captive screws in the scanner's panel using a $^{5}/_{64}$-in (or the metric equivalent) Allen wrench.
6. Insert a module extractor as follows in each of the two open holes, near these screws. While inserting the extractor, press the button on top of its handle. Releasing the button locks the extractor in the hole.
7. Pull the scanner firmly and evenly directly away from the backplane and the instrument. A slight rocking motion is helpful.
8. Install the replacement scanner by performing steps 1 through 7 in reverse order with opposite motion. When tightening the two captive screws on each end of the scanner, tighten the screws alternately to "walk" the board in evenly.

Instrument Replacement

➤ To replace an instrument module, perform the following procedure:

1. Turn the system's VXI cage power switch CB1 to its off position.
2. Remove the fixture/receiver assembly from the system.
3. Remove the scanner module that is connected to the instrument that will be removed. For better access to the instrument module, you may decide to remove additional scanner modules or filler bars on either side of the scanner.
4. Loosen the two captive screws using a $^{1}/_{8}$-in, flat-blade screwdriver with a long shaft, one near each end of the instrument module's front panel.
5. Insert a module extractor as follows in each of the two open holes, near these screws. While inserting the extractor, press the button on top of its handle. Releasing the button locks the extractor in the hole.
6. Pull the module firmly and evenly directly away from the backplane. A slight rocking motion is helpful. Be sure to use the precautions for handling devices subject to damage by static electricity.
7. Install the replacement instrument by performing steps 1 through 7 in reverse order with opposite motion. When tightening the two captive screws on each end of the instrument to the cage, tighten the screws securely; but use moderate torque.

UUT Power Supply

The instructions in this section only apply if your system has the optional UUT power supplies. Refer to Figure 4–4 for identification of UUT power supply cage slots and connectors. The UUT power supply controller module always resides in cage slot 0.

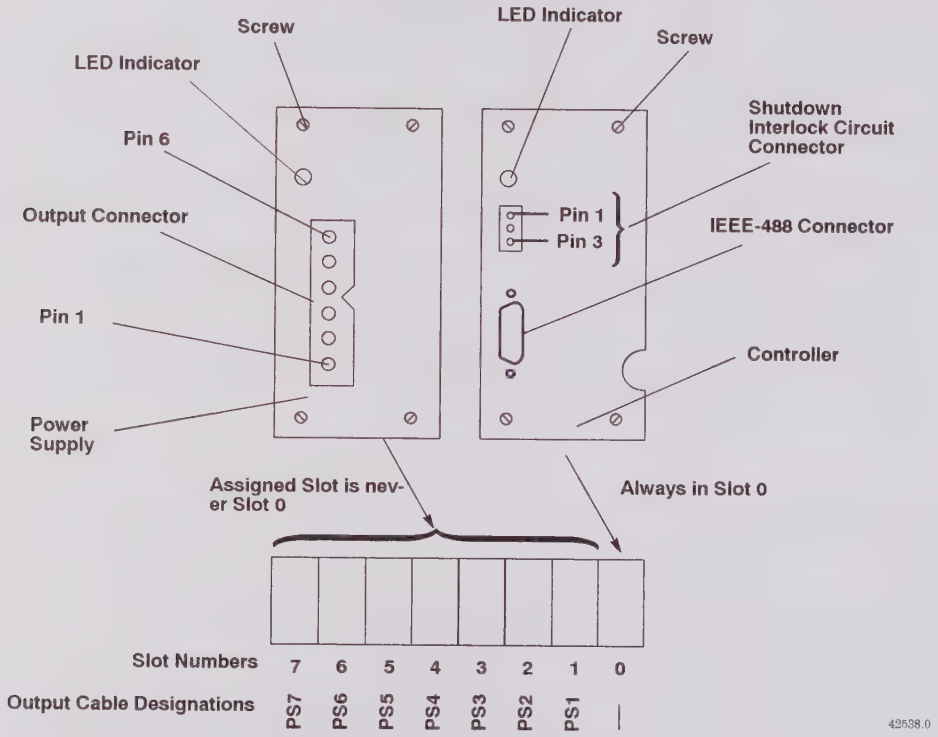


Figure 4–4 UUT Power Supply Cage Information

UUT Power Supply Controller Replacement

➤ To replace the UUT power supply controller, perform the following procedures:

1 Turn the system's main power switch to its off position.

NOTE For test systems with 3 Phase Power Controllers, the main power switch is CB22. For PDU test systems, the main power switch is CB1.

2 Disconnect the cables from the power supply controller module.

3 Remove the hardware that secures the controller to the UUT power supply cage with a $^1/_8$-inch flat-blade screwdriver; loosen the four small, captive, front-panel screws and pull the controller directly forward and out of the cage.

4 Remove the controller module from the UUT power supply cage.

5 Check the IEEE address switch settings on the controller that has been removed and set the same switch settings on the new controller. The IEEE address is 28. Close switches 4, 5, and 6. All other switches should be open.

CAUTION The UUT power supply controller must be installed in slot 0 of the UUT power supply cage. Installation in any other slot will cause damage.

6 Install the new controller (PN 9004-0029) by performing steps 1 through 5 in reverse order with opposite motion.

UUT Power Supply Module Replacement

➤ To replace a UUT Power Supply Module, refer to Figure 4–4 to identify the UUT power supply slot and output connector location:

1 Turn the system's main power switch CB1 to its off position.

2 Determine which slot in the UUT power supply cage holds the power supply to be replaced.

3 Disconnect the DC power cable from its output connector from the front of the selected UUT power supply.

4 Loosen the four small, captive, front-panel screws using a $^1/_8$-inch flat-blade screwdriver, and pull the power supply directly forward and out of the cage.

5 Check that the replacement is the same type as the previous one. The 3 types are:

- PN 9004-0020 that is rated for: 0 to 7V at 15A maximum
- PN 9004-0025 that is rated for: 0 to 20V at 8A maximum
- PN 9004-0026 that is rated for: 0 to 60V at 2.5A maximum

6 Install the new UUT power supply by performing steps 1 through 5 in reverse order with opposite motion.

UUT Power Supply Cage Fan Replacement

As shown in Figure 4–5, two fans are located on the UUT power supply cage.

➤ To replace a fan (PN 5180-4788)

1 Turn the system's main power switch to its off position.

NOTE For test systems with 3 phase power controllers, the main power switch is CB22. For PDU test systems, the main power switch is CB1.

2 Disconnect the system's power cable plug from the AC input power receptacle so there is no system connection to the AC input line voltage.

3 Gain access to the fans inside the UUT power supply cage, by removing the four screws from the cover located directly above the fans. Notice the nuts on the four screws that hold each fan to the cage.

4 Remove each of the four screws that secure the fan to be removed while holding the corresponding nut on the inside of the cage. Partially remove the fan.

5 Tag the fan's wiring, if desired. The connectors on the fan are labeled with "+, -, S" molded into the plastic. The wires are labeled with the same notation.

6 Pull each of the three single-wire connectors from the connector on the fan with pliers.

7 Remove the fan.

8 Repeat steps 1 through 7 in reverse order with opposite motion to install the replacement fan.

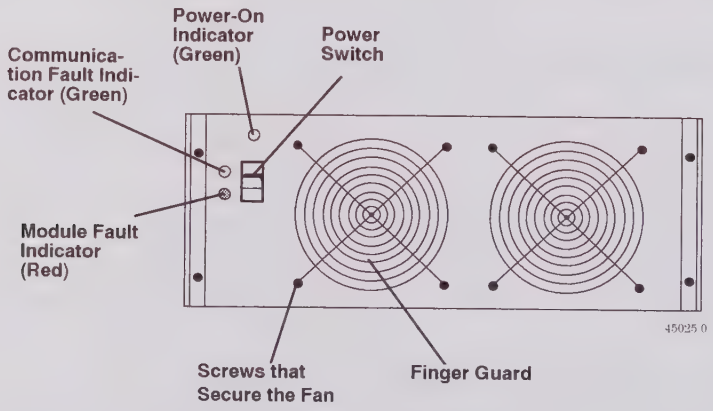


Figure 4–5 Panel on Rear of UUT Power Supply Cage

Power Monitor Board

The power monitor board (PN 9004-0358) is located on the upper right side of the GR2000 and GR4000 (lower left side of the GR1000*e*) when viewed from the rear. All connections to this board are made by cables.

➤ To replace the power monitor board

1 Turn the system's main power switch to its off position and disconnect the AC power cord.

NOTE For test systems with 3 Phase Power Controllers, the main power switch is CB22. For PDU test systems, the main power switch is CB1.

2 Remove the system's top panel, if possible.

3 Remove the fan assembly from the top rear of the system. Be careful not to pull out the small connecting wires.

4 Disconnect each of the cable connectors that are attached to the board.

CAUTION **Power monitor boards are static sensitive. To prevent damage to these boards:**

Use proper static sensitive precautions when handling the board.

Never place the board on the surface of the test system. If necessary, first place an ESD mat on the surface.

5 Remove the screws and retaining hardware. Remove the board, taking proper precautions for handling devices subject to damage by static electricity.

6 Check that any wire tie and switch settings on the faulty board are configured the same on the replacement board.

7 Install the replacement board by repeating steps 1 through 5 in reverse order with opposite motion.

System Power Supply

Perform the following procedure to replace the system power supply, PS1. Hardware removed during disassembly must be retained for reassembly. Refer to page 1-12 in Chapter 1 for a description of the system power supply.

The following tools are required:

- #1 or #2 right-angle Phillips screwdriver
- 12-in #1 Phillips screwdriver
- 6-in #2 Phillips screwdriver

GR1000e System Power Supply

The following procedure only applies to the GR1000*e*. For the removal and replacement procedure for the GR2000 and the GR4000 refer to page 4-11. Refer to page 1-5 in Chapter 1 for the location of the GR1000*e* system power supply.

➤ To replace the GR1000*e* power supply:

1 Turn the system's main power switch to its off position and disconnect the AC power cord.

NOTE For test systems with 3 Phase Power Controllers, the main power switch is CB22. For PDU test systems, the main power switch is CB1.

2 Remove the large rear panel. The power supply is located in the upper right side of the system. (rear view)

3 Remove the cable shield by removing four screws, two on the upper right side and two on the lower left side of the shield.

4 Note the orientation of the wires connected to the AC line filter mounted on the right side of the power supply chassis. Tag and disconnect the wires from the AC filter.

CAUTION Do not remove the metal strap under the power supply assembly following the removal of the mounting plate screws in step 6. Use it to support the power supply as you remove the assembly.

5 Remove the DC wiring harness from the filter board, verifying that all wires are clearly marked for reassembly. Tag any unmarked wires.

6 Remove the power supply assembly plate mounting screws.

CAUTION Use the same hardware to remount previously removed items, such as spacer bars, on the new power supply. Use of other hardware (such as longer screws) may penetrate the power supply's circuits.

7 Slide the power supply assembly out of the system chassis.

8 Remove the power supply, PN 6067-8124-00, from the assembly. Note the location of the filter board wires. Tag any unmarked wires.

9 Install the new power supply by performing steps 1 through 8 in reverse order with opposite motion. Remove cable/wiring tags after reconnection.

10 Check the DC voltages on the VXI backplane. For correct limits, see Table 6–1 in Chapter 6.

GR2000 and GR4000 System Power Supply

The following procedure only applies to the GR2000 and GR4000 test systems. For the removal and replacement procedure for the GR1000*e* refer to page 4-10. Refer to page 1-8 in Chapter 1 for the location of the GR2000 system power supply. Refer to page 1-11 for the location of the GR4000 system power supply.

➤ To replace the GR2000 or GR4000 power supply:

1 Turn the system's main power switch to its off position and disconnect the AC power cord.

NOTE For test systems with 3 phase power controllers, the main power switch is CB22. For PDU test systems, the main power switch is CB1.

2 Remove the large rear panel. The power supply is located in the lower left side of the system. (rear view)

3 Remove the cable shield by removing four screws, two on the upper left side and two on the lower right side of the shield.

4 Note the orientation of the wires connected to the AC line filter mounted on the left side of the power supply chassis. Tag and disconnect the wires from the AC filter.

CAUTION Remove the power supply assembly plate mounting screws.

Use the same hardware to remount removed items, such as spacer bars, on the new power supply. Use of other hardware (such as longer screws) may penetrate the power supply's circuits.

5 Partially slide the power supply assembly toward the rear of the enclosure.

6 Remove the DC wiring harness from the filter board, verifying that all wires are clearly marked for reassembly. Tag any unmarked wires.

7 Slide the power supply assembly out of the system chassis.

8 Remove the power supply, PN 6067-8124-00, from the assembly. Note the location of the filter board wires. Tag any unmarked wires.

9 Install the new power supply by performing steps 1 through 8 in reverse order with opposite motion. Remove cable/wiring tags after reconnection.

10 Check the DC voltages on the VXI backplane. For correct limits, see Table 6–1 in Chapter 6.

The following procedure describes how to service the 3 Phase Power Controller. The controller has a 24 volt power supply within it that is used to control the Emergency Power Off (EPO) circuit. If this power supply becomes defective, this procedure describes how to replace it.

3 Phase Power Controller Service

➤ To replace the 24V Power Supply within the 3 Phase Power Controller:

1 With the system power turned on, confirm that the 24 volt power supply is good or bad by removing any cable from J10 (EPO cable) on the right rear panel and measure the voltage at pins 1 (+) and 2 (-) for 24 volts. If defective, proceed to remove the supply.

2 Turn off the power from the system and unplug the main AC power cord.

3 Remove the 3 Phase Controller from the front of the system. This may require removal of some AC cords from the controller. Note their reciprocal locations for reassembly.

4 Remove the top cover and locate the power supply (PN 6067-8082-00) in the right front of the controller.

5 Remove the 2 screws from the right side of the controller that hold the power supply in place. Move the supply in and up to get it out of the controller.

6 Reverse the procedure to install the new power supply.

Operational Verification Program

Introduction

The Operational Verification Program (OVP) verifies operations of the GenRad-manufactured VXI switch modules, controllers, and power supplies. GR1000*e*, GR2000, and GR4000 test systems OVP packages include software, documentation, and an operational verification fixture for verifying the base system hardware, the VXIscan system Slot 0 controller, and any optional user power supplies.

For detailed information about OVPs and how to run them, refer to the *GENEVA Hardware Modules Manual*.

Other Servicing Information

Scanner Backplane DC Power

The maximum total power dissipation for the VXIscan subsystem is 200 watts. The maximum power dissipation in any one VXIscan module is limited to 15 watts.

System Power Supply

PS1 provides all DC power for the GR1000*e*, GR2000, and GR4000 test systems. The supplied DC voltages, maximum peak currents (I_{MP}), maximum dynamic currents (I_{MD}), and corresponding voltage limits are shown in Table 6–1. The total maximum power output of PS1 is 1000 watts.

Table 6–1
PS1 Power Supply Limits

Voltage	I_{MP} (amps)	I_{MD} (amps, p-p) for the GR1000*e* and GR2000	I_{MD} (amps, p-p) for the GR4000	Limits in V DC
+5V	150	22	6.0	+4.95 to +5.05
5.2V	50	9.5	2.9	-5.15 to -5.25
2V	10	6.5	3.0	-1.98 to -2.02
+24V	10.5	2.7	1.7	+23.75 to +24.25
24V	10	2.5	1.7	-23.75 to -24.25
+12V	10	3.3	1.9	+11.90 to +12.10
12V	10	3.3	1.9	-11.90 to -12.10

NOTE

The user must calculate the total power required by the VXI modules and scanners installed in the system. The total available system power for a specific configuration consisting of VXI and scanner modules is defined in Table 6–2.

Table 6–2
Total Available System Power - VXI and Scanner Module

System Model	PS1 Capacity	Slot 0 Requirements (Fixed)	System Power Available †
GR1000*e*	1000W	50W	950W
GR2000	1000W	50W	950W
GR4000	1000W	88W	912W

†Scanner backplane is limited to 200 watts maximum power exclusive of the scanner controller.

VXI Instrument Board Addressing

The following address settings are applicable to the instruments in the VXI cage for the GR1000*e* and GR2000 test systems.

Instrument	Address Setting
Slot 0 board	Hex 80, decimal 128
Other VXI Instrument boards	Dynamic or above decimal 128

The following address settings are applicable to the instruments in the VXI cage for the GR4000 test system.

Instrument	Address Setting
VME-MXI Board	Hex 80, Decimal 128
Slot 0 board	Hex 80, decimal 129
Other VXI Instrument boards	Dynamic or above decimal 129

Receiver Power Block Connections

Table 6–3 shows the UUT power supply pin assignments on the GR1000*e* receiver power block. Figure 6–1 shows the pin locations in the receiver power block as viewed from the wiring side.

Table 6–3
UUT Power Supply Pin Assignments on the GR1000*e* Receiver Power Block

UUT Power Supply Signal Name	Receiver Block Connector Pin Number	UUT Power Supply Signal Name	Receiver Block Connector Pin Number
PS1 IL	PB 01	PS4 IH	PB 22
PS1 IL	PB 02	PS4 IH	PB 23
PS1 SL	PB 03	PS4 SH	PB 24
PS1 IH	PB 04	PS5 IL	PB 25
PS1 IH	PB 05	PS5 IL	PB 26
PS1 SH	PB 06	PS5 SL	PB 27
PS2 IL	PB 07	PS5 IH	PB 28
PS2 IL	PB 08	PS5 IH	PB 29
PS2 SL	PB 09	PS5 SH	PB 30
PS2 IH	PB 10	PS6 IL	PB 31
PS2 IH	PB 11	PS6 IL	PB 32
PS2 SH	PB 12	PS6 SL	PB 33
PS2 IL	PB 13	PS6 IH	PB 34
PS3 IL	PB 14	PS6 IH	PB 35
PS3 SL	PB 15	PS6 SH	PB 36
PS3 IH	PB 16	PS7 IL	PB 37
PS3 IH	PB 17	PS7 IL	PB 38
PS3 SH	PB 18	PS7 SL	PB 39
PS4 IL	PB 19	PS7 IH	PB 40
PS4 IL	PB 20	PS7 IH	PB 41
PS4 SL	PB 21	PS7 SH	PB 42

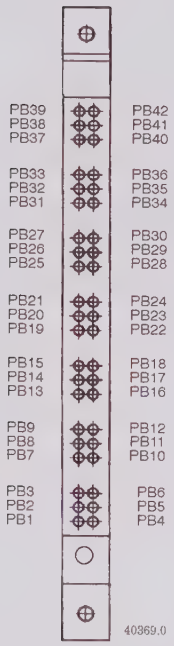


Figure 6–1 GR1000*e* Power Block Connector Pin Locations, Wiring Side

Table 6–4 shows the UUT power supply pin assignments on the GR2000 and GR4000 receiver power block. Figure 6–2 shows the pin locations in the receiver power block as viewed from the wiring side.

Table 6–4
UUT Power Supply Pin Assignments
on the GR2000 and GR4000 Receiver Power Block

Pin Designations	Power Supply Module Number	Terminal Connected via		
		Left Pin	Middle Pin	Right Pin
PB40, PB41, PB42	7	Output high	Output high	Sense high
PB37, PB38, PB39	7	Output low	Output low	Sense low
PB34, PB35, PB36	6	Output high	Output high	Sense high
PB31, PB32, PB33	6	Output low	Output low	Sense low
PB28, PB29, PB30	5	Output high	Output high	Sense high
PB25, PB26, PB27	5	Output low	Output low	Sense low
PB22, PB23, PB24	4	Output high	Output high	Sense high
PB19, PB20, PB21	4	Output low	Output low	Sense low
PB16, PB17, PB18	3	Output high	Output high	Sense high
PB13, PB14, PB15	3	Output low	Output low	Sense low
PB10, PB11, PB12	2	Output high	Output high	Sense high
PB07, PB08, PB09	2	Output low	Output low	Sense low
PB04, PB05, PB06	1	Output high	Output high	Sense high
PB01, PB02, PB03	1	Output low	Output low	Sense low

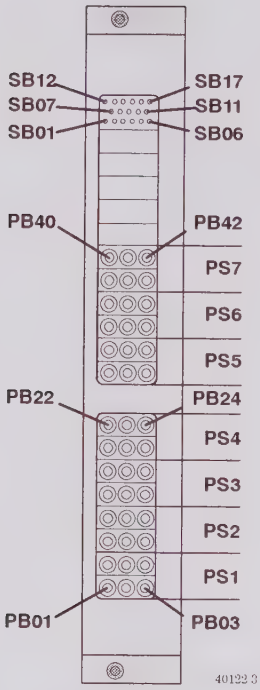


Figure 6–2 GR2000 and GR4000 Power Block Connector Pin Locations, Wiring Side

The GR2000 and GR4000 power block connector also contains pins SB01 through SB17. These are signal pins for the optional ring generator. Table 6–5 shows the signal pin assignments for the ring generator. If the ring generator is not installed, these signal pins are available for other uses. SB01 to SB17 are connected to J114 on the system I/O panel.

Table 6–5
Signal Pin Assignments on the
GR2000 and GR4000 Receiver Power Block

Pin Number	Signal Name	Purpose
SB01 to SB06		No connection
SB07	TESTHI_UUT	Voltage sense input high, for OVP support
SB08	TIP_UUT	TIP output of the ring generator (high side of AC/DC UUT stimulus)
SB09	GND_UUT	GROUND connection for ring generator output (connect to GROUND on the UUT for ground referenced output configurations)
SB10	RING_UUT	RING output of the ring generator (high side of AC/DC UUT stimulus
SB11	TESTLO_UUT	Voltage sense input low, for OVP support
SB12	DC_SOURCE_HI	External + DC source input for Battery Feed
SB13	DCHI_UUT	High output of Battery Feed DC voltage
SB14	CVR_INTERLOCK_UUT	Safety interlock contact, normally open
SB15	DC_SOURCE_LO	External - DC source input for Battery Feed
SB16	DCLO_UUT	Low output of Battery Feed DC voltage
SB17	GROUND	System ground

Power Monitoring

The following sections describe the operation of the power monitor board and its diagnostic LEDs.

Overview of Power Monitor Operation

When the power monitor identifies a Warning or Panic mode condition, it activates the power monitor board LEDs to indicate the out-of-tolerance element. When a Warning mode condition occurs, the system keeps running. If the Warning mode condition continues for 10 minutes, the power monitor board shuts down the system. If the situation occurs, perform this repower procedure.

➤ To reapply power to the system

1. Remove connector P5 from the power monitor board.
2. Power up the system.
3. Using a voltmeter, check the voltage outputs on each system power supply for its correct voltage value and observe the power monitor board LEDs to identify the faulty element. Refer to Table 6–6 for the fault identification codes.

NOTE The Panic mode response is NOT implemented in the GR1000*e*, GR2000, and GR4000 test systems.

Power Monitor Board LEDs

Refer to Figure 6–3 for the location of the LEDs on this board. LED CR1, when lighted green, indicates that +5V is present on the power monitor board. LEDs CR2 through CR9, when lighted red in various patterns, indicate the faulty element. Refer to page 6-9 for the diagnostic status definitions. When viewing LEDs CR2 through CR9, observe them from the right side of the board.

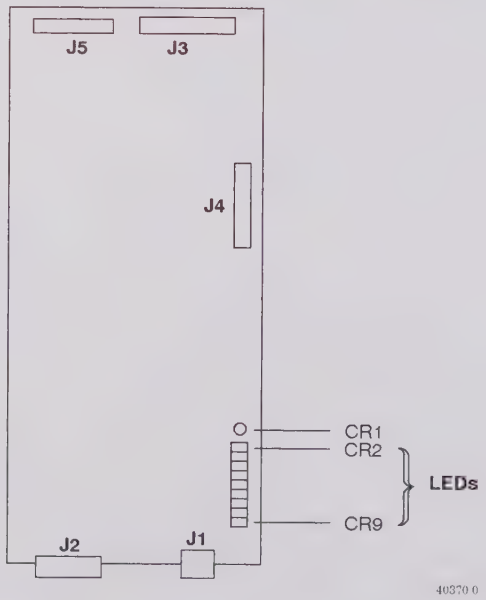


Figure 6–3 Power Monitor Board LED Locations

Diagnostic Status Definitions

Table 6–6 defines the element being monitored, its description, and the lighted/unlighted status for these LEDs when a fault is indicated by the power monitor software. The following element numbers are not used: E7, E9, E10, E11, and E13.

Table 6–6
LED Fault Identification Codes on the Power Monitor Board

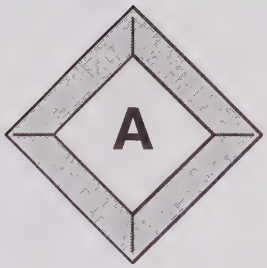
LED Number								
CR9	CR8*	CR7	CR6	CR5	CR4	CR3	CR2	Element Identification **
○	B/○	○	○	○	○	○	○	E0: VXIbus +24V
○	B/○	○	○	○	○	○	●	E1: VXIbus +12V
○	B/○	○	○	○	○	●	○	E2: VXIbus +5V
○	B/○	○	○	○	○	●	●	E3: VXIbus -2V
○	B/○	○	○	○	●	○	○	E4: VXIbus -5.2V
○	B/○	○	○	○	●	○	●	E5: VXIbus -12V
○	B/○	○	○	○	●	●	○	E6: VXIbus -24V
○	B/○	○	○	●	○	○	○	E8: Scanbus +5.1V
○	B/○	○	○	●	●	○	○	E12: Fan #1
○	B/○	○	○	●	●	●	○	E14: Ambient Temperature
○	B/○	○	○	●	●	●	●	E15: On-Board +5V
○	B/○	○	●	○	○	○	○	E16: On-Board A/D Converter +5V Ref
○	B/○	○	●	○	○	○	●	E17: On-Board 2.5V Ref
○	B/○	○	●	○	○	●	○	E18: On-Board 1.25V Ref
○	B/○	○	●	○	○	●	●	E19: On-Board +12V
○	B/○	○	●	○	●	○	○	E20: On-Board +12V Status OK Bit
○	B/○	○	●	○	●	○	●	E21: On-Board -12V Status OK Bit
○	B/○	○	●	○	●	●	○	E22: Fan #2
○	B/○	○	●	○	●	●	●	E23: Fan Power +24V

● = LED is lighted; ○ = LED is not lighted

* B = CR8 LED is blinking if in Panic mode; not lighted if in Warning mode

** The letter E followed by a number indicates the element number being monitored.

Field Replacement Units



FRU Part Ordering Information

This appendix contains ordering information for GR1000*e*, GR2000, and GR4000 test systems Field Replaceable Units (FRUs). The following tables contain FRU part numbers and descriptions.

- Table A–1 is a list of testing system FRUs.
- Table A–2 is a list of parts for the PCs and related items.

Equipment Return

Before returning a system module to GenRad for servicing, obtain a Returned Material Authorization (RMA) number from the GenRad Customer Care Desk (1-800-4-GENRAD); press the number 1, then press the number 2). Including this number in all correspondence and on a tag attached to the returned item will ensure proper handling and identification.

For all systems not covered by warranty, you should forward a purchase order to avoid unnecessary delay. For return shipment, use packaging that is adequate to protect the module from static-sensitive and in-transit damage. Contact the GenRad Customer Care Desk for further information about returning equipment.

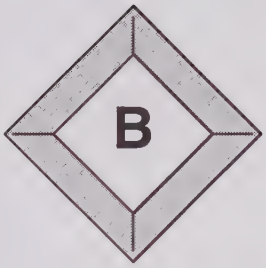
Table A–1
Field Replaceable Units

Part Number	Item
5180-4788-00	UUT Power Supply Chassis Fan (23 Vdc)
5231-3211-00	Velcro Strip, Filter Mounting
5270-5463-00	Air Filter, Lower Front
5270-5833-00	Air Filter, Rear (quantity 1; system uses 2)
6067-8124-00	PS1 DC Power Supply
9003-0134-00	Footswitch
9004-0002-00	Digital Instrument Scanner
9004-0005-00	VXI Instrument Scanner Type 1
9004-0005-08	VXI Instrument Scanner Type 2
9004-0020-02	0 to 7Vdc UUT Power Supply
9004-0025-02	0 to 20Vdc UUT Power Supply
9004-0026-02	0 to 60Vdc UUT Power Supply
9004-0029-02	UUT Power Supply Controller Module
9004-0120-00	Hybrid 64-64x3 Scanner
9004-0238-00	HF Scanner
9004-0358-00	Power Monitor Board
9004-0331-00	High Power Scanner
9004-0339-01	50 ohm RF Scanner
9004-0457-00	75 ohm RF Scanner
9010-0163-00	Okidata 320 Serial Printer, 120V
9010-0164-00	Okidata 320 Serial Printer, 240V
9010-0273-01	National C-size Slot 0 Controller Board and Adapter
9004-0009-01	MXI Scanner Controller Board
9021-0001-00	GenRad Keypad
9021-0012-01	AT-GPIB/TNT Board

Table A–2
PCs and Related Items Parts List

Part Number	Item
1765-6021-00	IEEE Cable (6.6 ft)
4230-9833-00	Filter Connector
9001-0103-00	RJ45 to DB25 Adaptor
9018-0039-01	15-Inch Color Monitor and Cable
9018-0038–01	17-Inch Color Monitor and Cable
9021-0018-00	Modem Cable DB9 - DB25
9021-0041-00	4/8 Port RS-232 Board and Distribution Panel-Consists of: 4/8 Port RS-232 Board, PN 9021-0073-00 Distribution Panel (male, 12 in. length), PN 9021-0074-00
9021-0226-00	4/8 Port RS-232 Board, 4 Port Distribution Panel (male, 12 in. length), P/N 9021-0263–00 for the Pentium II PC
9021-0050-00	Additional 4-Port RS-232 Option
9021-0118-00	Bar Code Reader Assembly w/ Wand (Caere Model 1021)
9021-0264-00	8 Port Distribution Panel for the Comtrol board
9021-0014-00	4 meter MXI cable
9021–0013–01	AT–MXI interface board

System Interconnect Diagrams (GR1000*e*, GR2000, GR4000)



nmRmFnmRgPfnnRPaOUgOm

The system interconnect diagrams illustrate the cable connections, the hardware part numbers, and the system interconnections. The symbol indicates an optional item. Other information contained in these diagrams will enable the user to understand the organization of the GR1000*e*, GR2000, and GR4000 systems. Refer to Table B–1 for the location of the diagram for your system.

Table B–1
Diagram Locations

System	Figure
GR1000*e*	Figure B–1
GR2000	Figure B–2
GR4000	Figure B–3

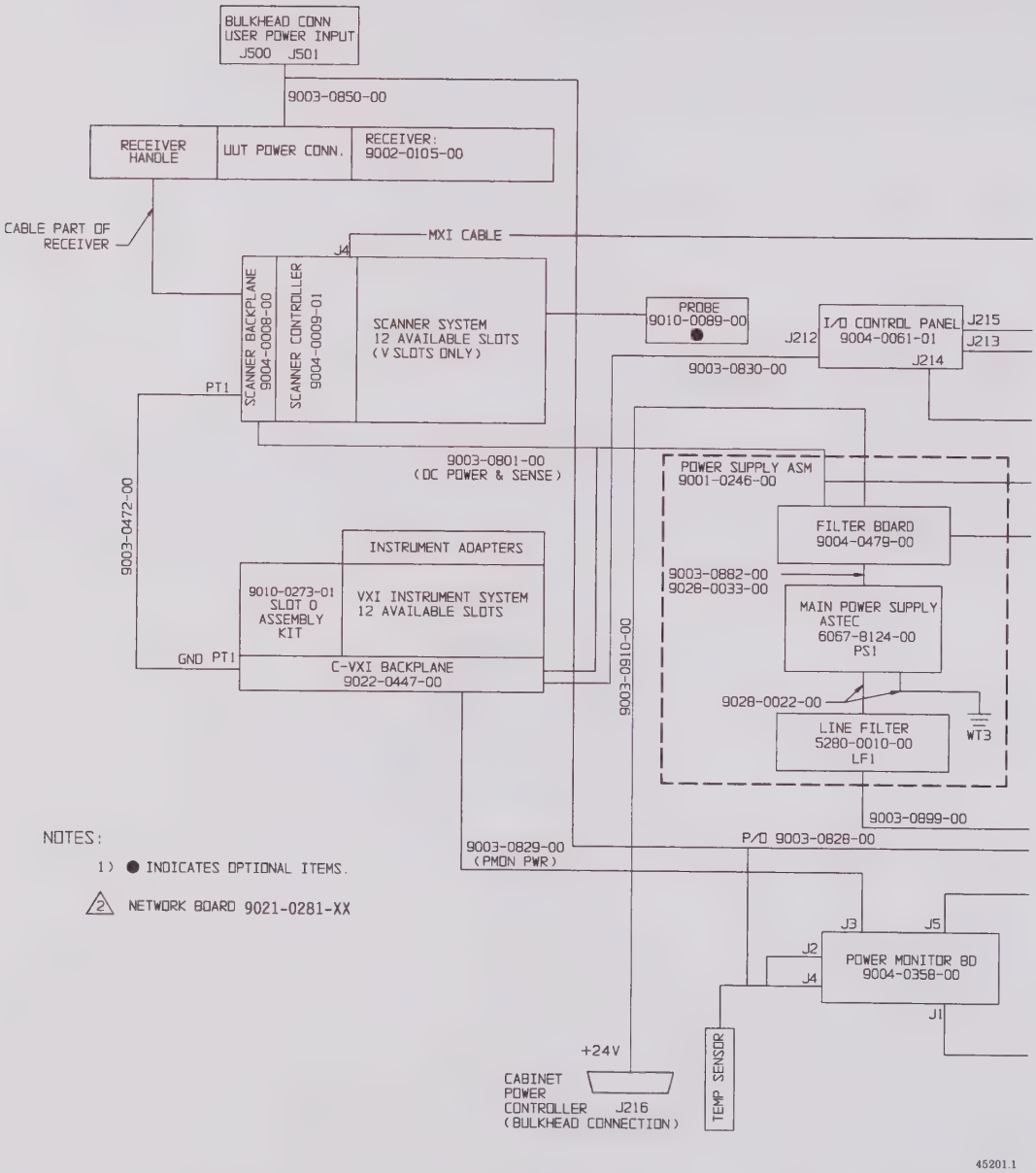


Figure B–1 GR1000*e* Interconnect Diagram (Part 1 of 2)

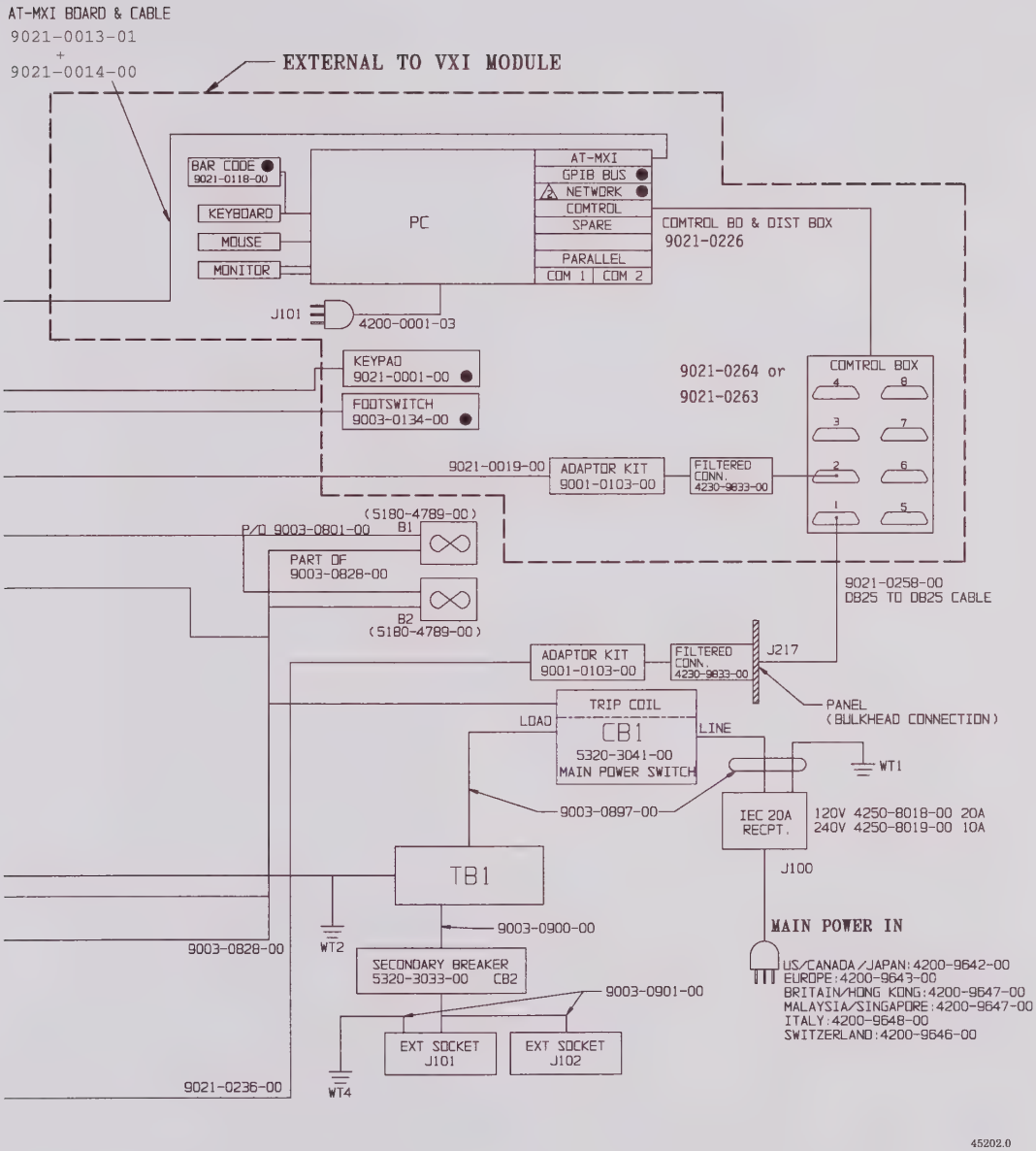


Figure B–1 GR1000*e* Interconnect Diagram (Part 2 of 2)

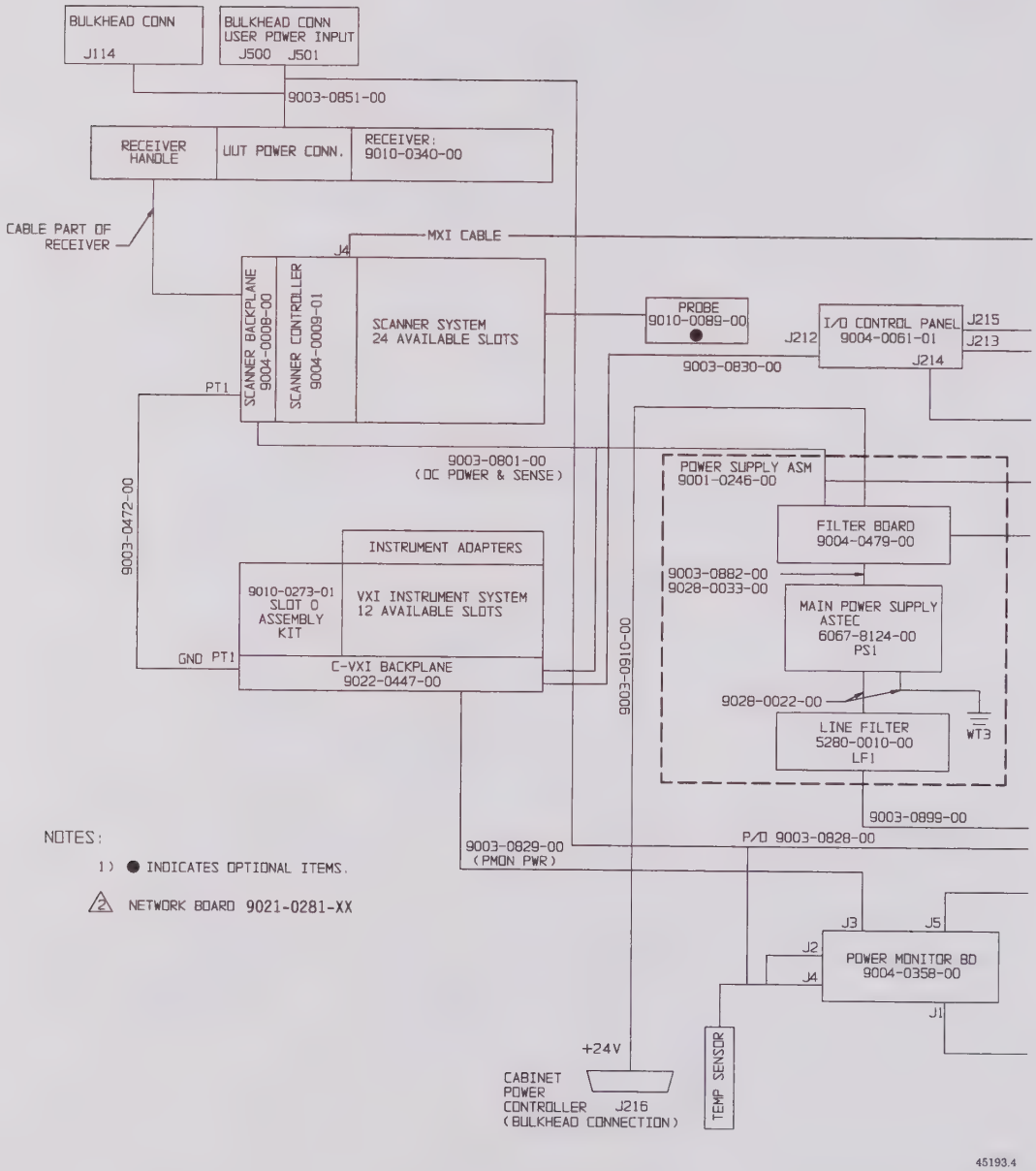


Figure B–2 GR2000 Interconnect Diagram (Part 1 of 2)

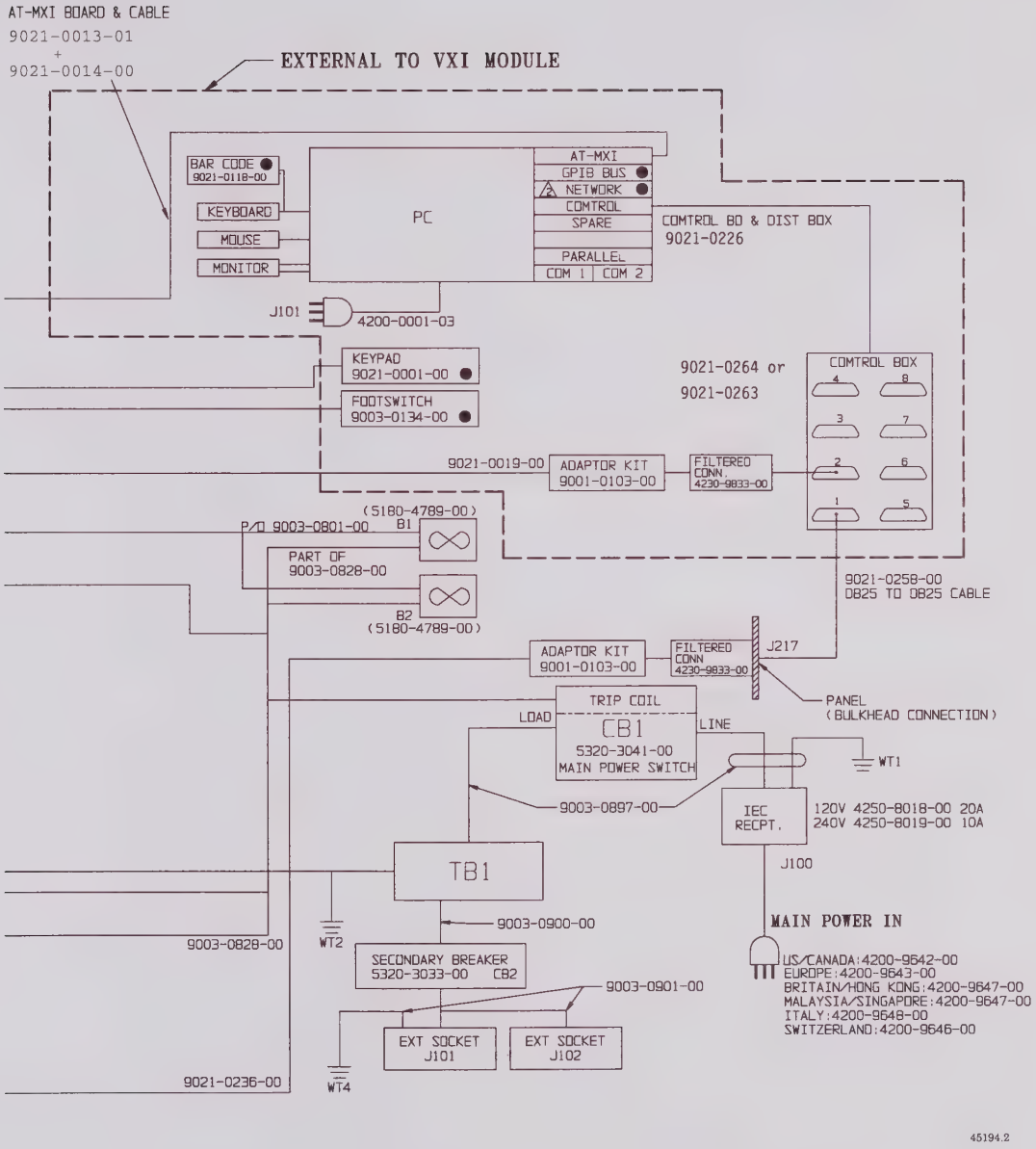


Figure B–2 GR2000 Interconnect Diagram (Part 2 of 2)

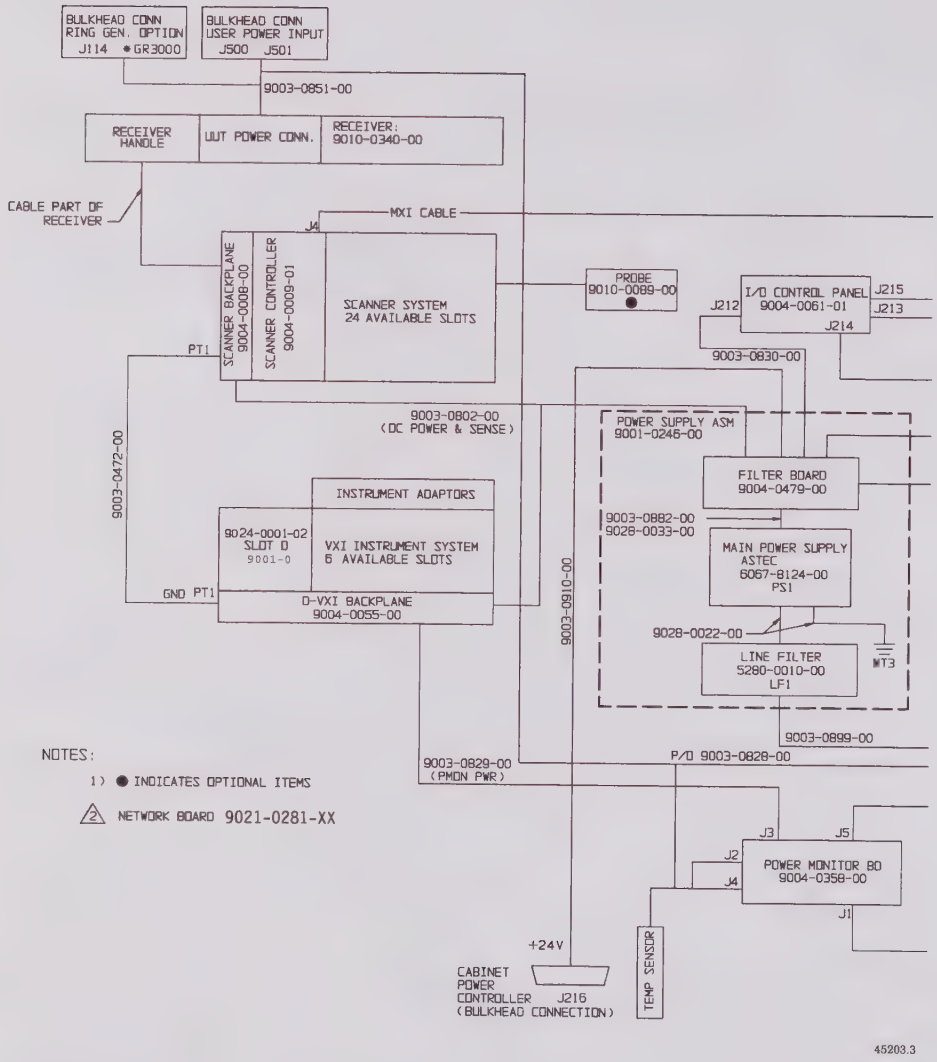


Figure B–3 GR4000 Interconnect Diagram (Part 1 of 2)

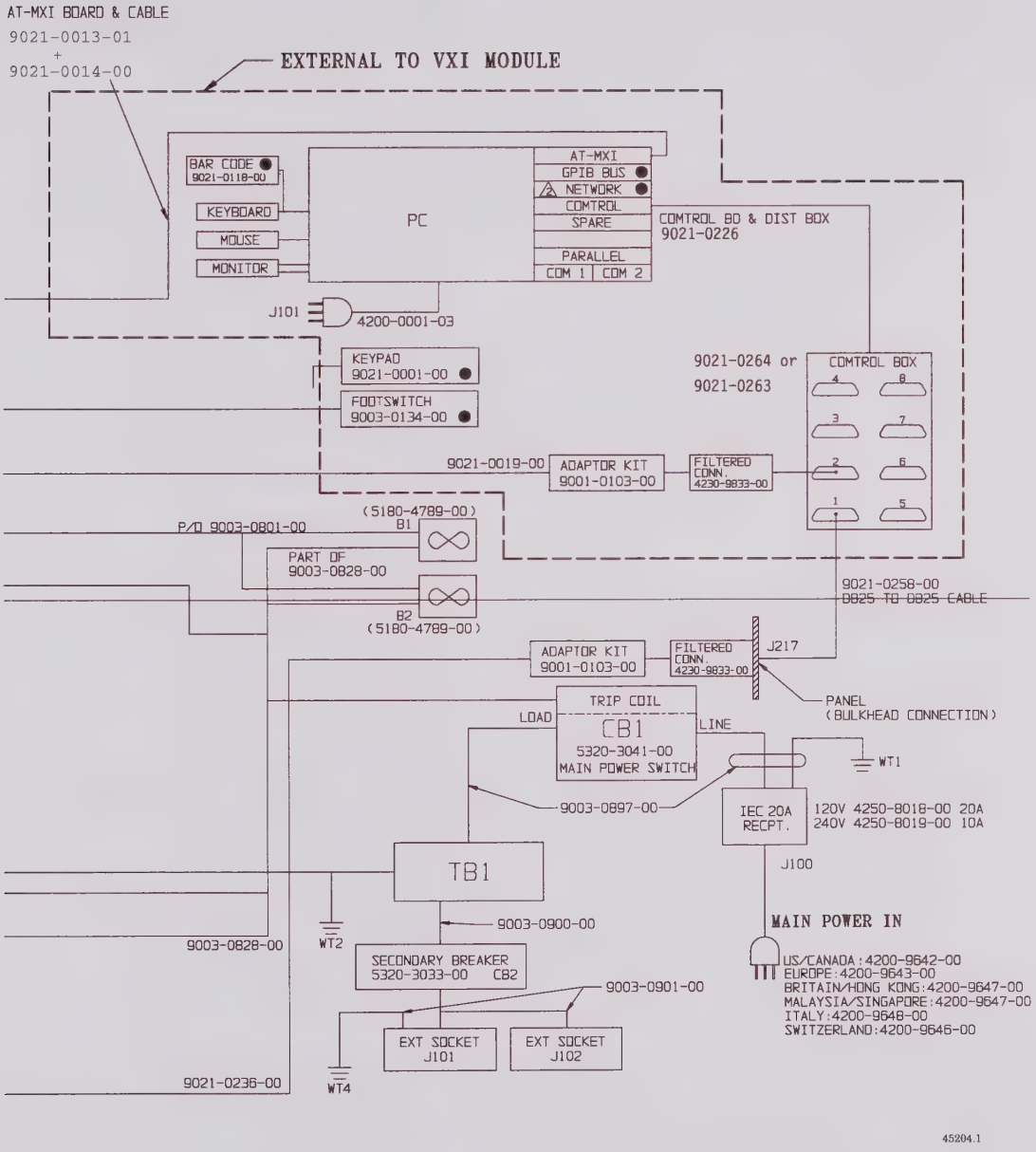
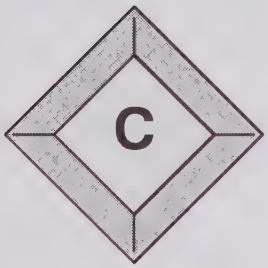


Figure B–3 GR4000 Interconnect Diagram (Part 2 of 2)

Technical Summary



The VXIcage contains the following components:

- VXIbus Instruments, including the Slot 0 Controller and instrument adaptors
- VXIscan Scanners, including the Scanner Controller
- System Power Supply, PS1
- Power Monitor Board
- Input Power Requirements
- Cooling System

These components are combined into a rack-mountable integrated test and measurement configuration. Refer to Figure 1-3 for a sectional view of the GR1000*e*. Refer to Figure 1-6 for a sectional view of the GR2000. Refer to Figure 1-9 for a sectional view of the GR4000.

VXIcage and Backplanes

The VXIcage serves as the housing for all VXIbus instruments and VXIscan scanners used in the GR1000*e*, GR2000, and GR4000 test systems. The instruments and scanners are mounted in separate, independent backplanes. The scanners mate, physically and electrically, with the VXIbus instruments.

VXIbus Backplane Features

The available instrument backplane features are:

VXIbus Backplane, C-Size for GR1000e and GR2000

- 13 C–size VXIbus instrument slots, one of which is used for the Slot 0 Controller
- a synchronous 10 MHz differential clock
- 2 ECL trigger lines
- 8 TTL trigger lines
- 24 local bus lines
- VXIbus Dynamic Configuration
- bus grant jumper connections

VXIbus Backplane, D-Size for GR4000

- 13 D–size VXIbus instrument slots, one of which is used for the Slot 0 Controller
- a 100MHz differential clock and a synchronous10 MHz differential clock
- A synchronizing signal for 100 MHz clock edge selection (SYNC100)
- 6 ECL trigger lines
- 8 TTL trigger lines
- 36 local bus lines
- STARX and STARY trigger lines for precision module–to–module timing
- VXIbus Dynamic Configuration

Slot 0 VXIbus Controllers

GR1000*e*, GR2000, and GR4000 test systems employ two types of Slot 0 Controllers: The GR1000*e* and GR2000 use a C-size controller, PN 9010-0273, manufactured by National Instruments. The GR4000 uses a D-size controller, PN 9024-0001, manufactured by GenRad.

This section summarizes the use of the VXI-MXI interface in the GR1000*e*, GR2000, and GR4000 test systems. For more detailed information, specifications, and theory of operation of the VXI-MXI, refer to the National Instruments *VXI-MXI User Manual* supplied with your test system.

C-Size Slot 0 VXIbus Controller for GR1000e and GR2000

The C-size Slot 0 VXIbus Controller is installed in slot 0 of the VXIbus backplane. Its connector locations are shown in Figure C-1. Connectors P1 and P2 connect the controller to the VXI backplane. An adaptor mounts on the front panel of the Slot 0 VXIbus controller. This adaptor connects the MXIbus and trigger lines to the MXI-VXIscan Controller.

CAUTION **Do not install the Slot 0 VXIbus Controller in any slot other than slot 0. Doing so can damage the controller, the VXIbus backplane, or both.**

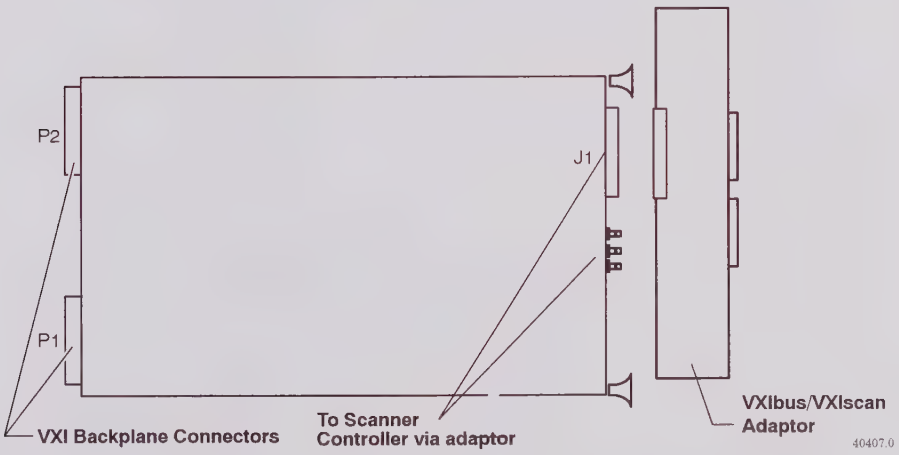


Figure C-1 Connector Locations for the C-size Slot 0 VXIbus Controller

The switches and jumpers that need to be set can be accessed through openings in the instrument's enclosure. The enclosure is shown in Figure C–2.

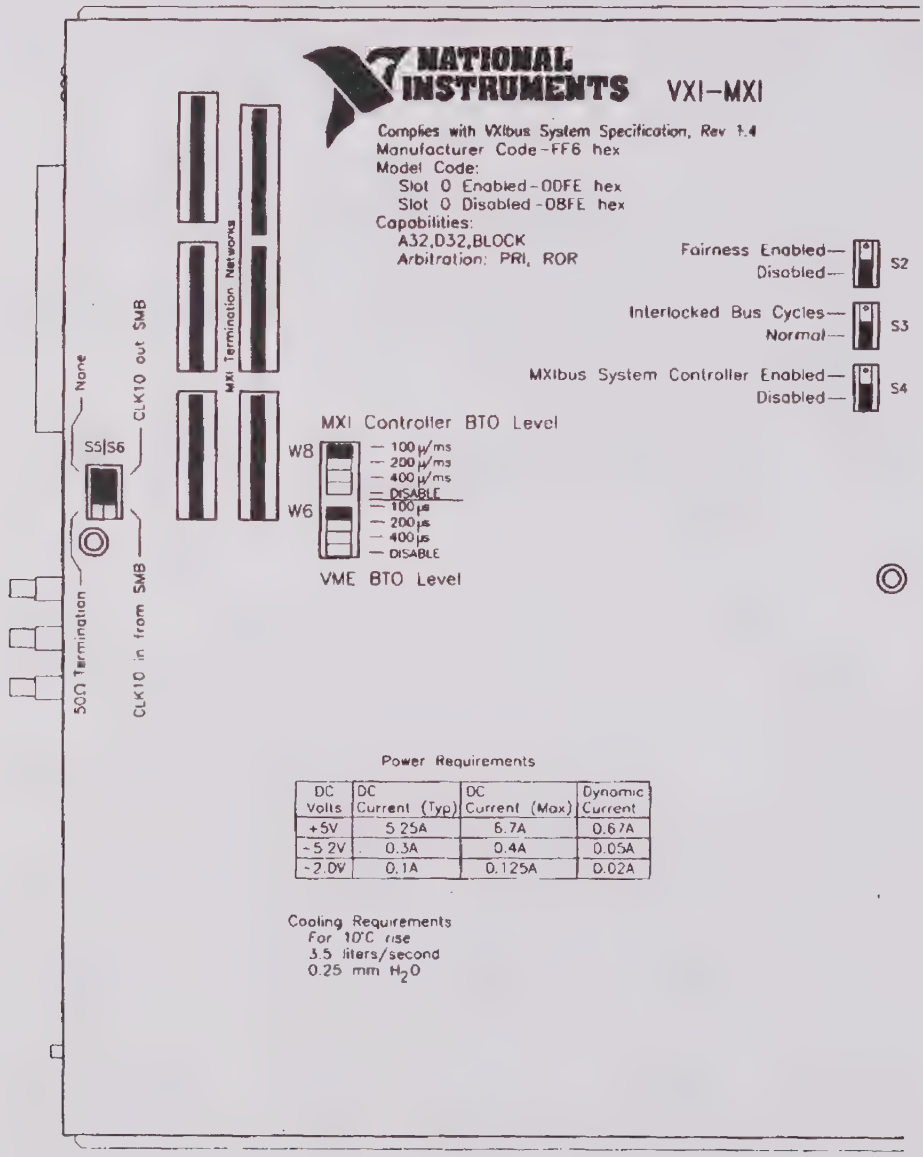


Figure C–2 Switches and Jumpers on the C-size Slot 0 VXIbus Controller (Part 1 of 2)

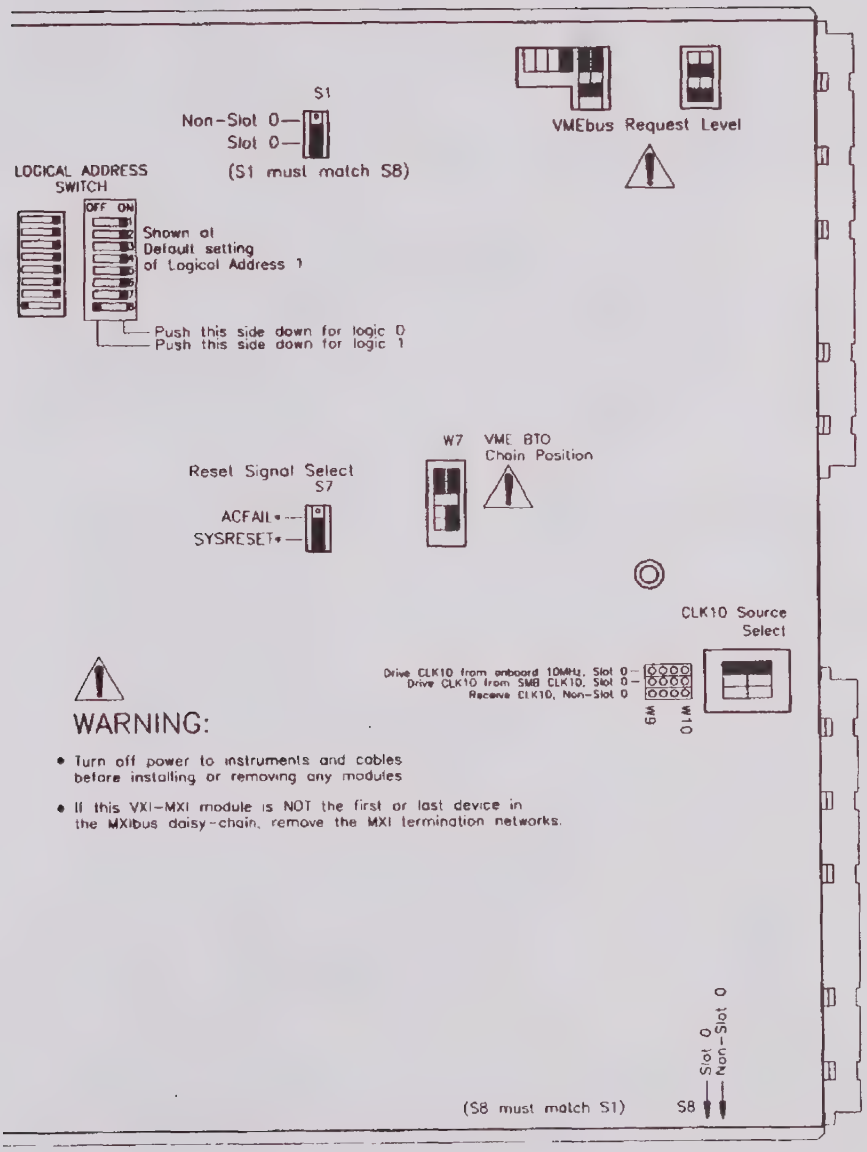

S1
Non-Slot 0
Slot 0
(S1 must match S8)
VMEbus Request Level
LOGICAL ADDRESS SWITCH
OFF ON
Shown at Default setting of Logical Address 1
Push this side down for logic 0
Push this side down for logic 1
W7 VME BTO Chain Position
Reset Signal Select S7
ACFAIL*
SYSRESET*
CLK10 Source Select
Drive CLK10 from onboard 10MHz, Slot 0
Drive CLK10 from SMB CLK10, Slot 0
Receive CLK10, Non-Slot 0
W9
W10
WARNING:
• Turn off power to instruments and cables before installing or removing any modules
• If this VXI-MXI module is NOT the first or last device in the MXIbus daisy-chain, remove the MXI termination networks.
(S8 must match S1)
S8
Slot 0
Non-Slot 0

Figure C–2 Switches and Jumpers on the C-size Slot 0 VXIbus Controller (Part 2 of 2)

The proper jumper settings for the C-size Slot 0 VXIbus controller are shown in Figure C–3.

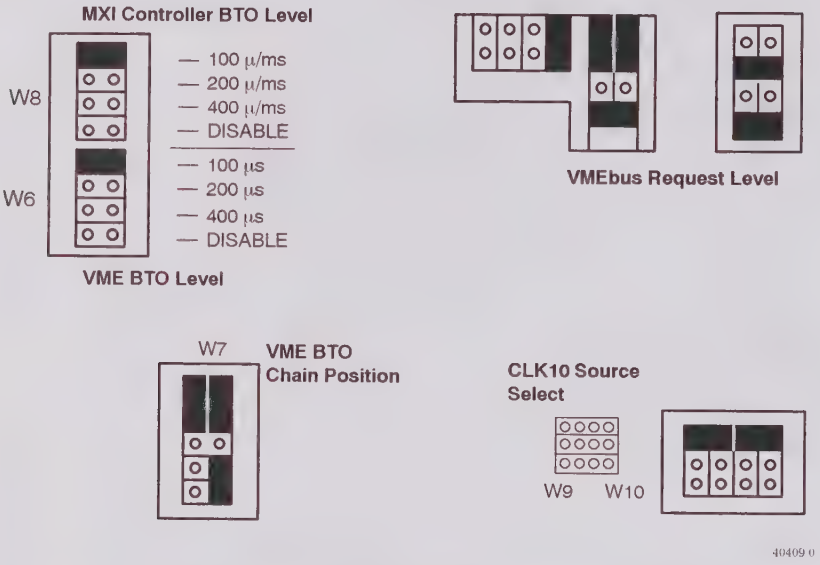


Figure C–3 C-size Slot 0 VXIbus Controller Jumper Settings

The proper switch settings for the C-size Slot 0 VXIbus controller are shown in Figure C–4.

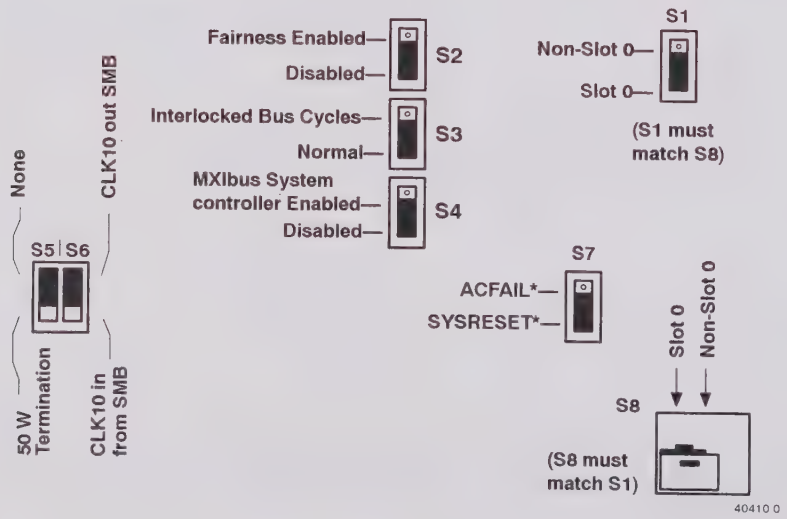


Figure C–4 C-size Slot 0 VXIbus Controller Switch Settings

NOTE The logical address switch should be set to 128 as shown in Figure C–5.

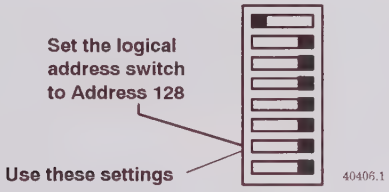


Figure C–5 C-size Slot 0 VXIbus Controller Logical Address Switch Settings

D-Size Slot 0 VXIbus Controller for GR4000

The GR4000 uses a GenRad manufactured D-size slot 0 controller PN 9024–0001. The address switch settings for this controller are shown in Table C–1.

Table C–1
D-size Slot 0 VXIbus Controller
Address Switch Settings

Address	Switch Settings
Slot 0	SW1-1 OPEN
	SW1-2 CLOSED
	SW1-3 CLOSED
129	SW1-4 CLOSED
	SW1-5 CLOSED
	SW1-6 CLOSED
	SW1-7 CLOSED
	SW1-8 OPEN
VME-MXI	SW1-1 OFF
	SW1-2 ON
	SW1-3 ON
128	SW1-4 ON
	SW1-5 ON
	SW1-6 ON
	SW1-7 ON
	SW1-8 ON

To verify that the Slot 0 VXIbus controller is installed and in proper working order, use the **resman** command to run the resource manager. If the Slot 0 VXIbus Controller is working properly, the following message appears.

```
PASSED SELF TEST
```

For more detailed technical information about the D–Size VXIbus controller, refer to the *GENEVA Hardware Modules Manual*.

VXIscan Subsystem

The VXIscan Subsystem serves as the housing for all VXIscan modules. It has its own independent backplane for flexibility. With the VXIscan modules it provides the link between the UUT and the instrumentation. VXIscan modules housed in the VXIscan Subsystem mate, physically, and electrically, with the VXIbus modules located in the VXIbus instrument cage. Hard–docking connectors make the connection to VXIbus instrument modules or VXIscan Adapters.

The VXIscan backplane provides connectivity for routing analog signals between VXIscan slots, supporting general–purpose signal routing and "hybrid" scanning. For maximum flexibility, the VXIscan backplane provides two different types of signal routing buses. There is an 8 channel daisy–chained High Frequency Analog bus (HFAbus) for 50 Ohm high fidelity signal routing and a 12 channel tapped General Purpose Analog bus (GPAbus) for lower frequency analog signal routing.

The VXIscan subsystem provides the electrical and physical link between the UUT and the test system's instruments. The available scanner backplane features are:

- 26 VXIscan scanner slots located at twice the density of VXIbus instrument slots–two of which are used for the VXIscan controller
- High performance 50-ohm, 8-channel, daisy-chained High Frequency Analog (HFA) Bus with greater than 100 MHz bandwidth, 50-ohm terminated
- 12-channel, tapped General Purpose Analog (GPA) Bus with > 1 MHz bandwidth, 50-ohm terminated
- Digital Control Bus, with 16-bits for data, 12-bits for address, and a dedicated slot select line for each VXIscan scanner slot
- One-channel, daisy-chained Probe Bus with greater than 100 MHz bandwidth
- Four auxiliary power rails
- Analog ground (separate from VXIbus ground to ensure low noise)
- Reference ground (connected to the UUT's ground)
- Software readback of VXIscan scanner part and revision numbers

The following table contains additional electrical specification data for the VXIscan subsystem.

Table C–2
VXIscan Bus Subsystem Specifications

Number of VXIscan slots:	26 slots
Number of V Slots above VXIbus instruments:	13
Number of X Slots between VXIbus instruments:	13
HFAbus:	
Number of HFAbus channels	8
Bus configuration:	Daisy–chained through each of the 13 slots
Maximum carrying voltage:	200V
Maximum carrying current:	1A
Bandwidth	>100 MHz, 50 ohm terminated
GPA Bus:	
Number of GPAbus channels;	12
Bus configuration:	tapped bus accessing all 26 slots
Maximum carrying voltage:	200V
Maximum carrying current:	2A
Bandwidth:	> 1 MHz, 50 ohm terminated

Table C–2
VXIscan Bus Subsystem Specifications

Probe Bus:	
Number of Probe bus channels;	1
Bus configuration:	Daisy–chained through each of the 13 slots
Maximum carrying voltage:	200V
Maximum carrying current:	1A
Bandwidth:	> 100MHz, 50 ohm terminated
System Noise and Spurious†:	
DC–1 MHz	< –95 dBm (noise B/W=10KHz)
DC–30 MHz	<–85 (noise B/W=1KHz)
30–50MHz	<–80 (noise B/W=1KHz)
DC–1 MHz, Narrow band freq. components:	<–95 dBm
1–80 MHz, Narrow band freq. components:	< –70 dBm
80–250 MHz, Narrow band freq. components:	< –60 dBm
Insertion Loss†:	
End–to–End	
DC–65 MHz:	< 3 dB
65–100 MHz:	< 4 dB
HFAbus Loss:	
DC–65 MHz:	< 1 dB
65–100 MHz:	< 1.5 dB
Crosstalk††:	
DC–10 MHz:	<–40 dB
10–100 MHz:	< –35dB

† 50 ohm source and detector, signal path from slot 1 to slot 12 through the HFA bus and HF switch modules.

†† 50 ohm source and detector, signal path from slot 1 to slot 12 through VXIscan HF Switch Modules and the HFA bus. Near end and far end crosstalk configurations with 50 ohm termination installed on adjacent signal paths.

MXI-VXIscan Controller

The MXI-VXIscan controller (9004-0009) is physically located in the first slot (slot 0) of the of the modular GENEVA system Scanner Backplane. Its primary function is to be the master of the Scanner Bus, because the scanners themselves are slave devices.

The MXI-VXIscan controller is designed to provide these paths:

- An address/data/control path to the various scanner types
- A connection path from the scanners to the receiver
- A connection path for the MXI interface between the Slot 0 Controller and the host PC.

All scanner controller registers are mapped into A24 space as determined by the VXI Resource Manager.

The Scanner controller is a focal point of signal distribution to and from the other scanners, the fixture, and the host PC. Some of the signals that pass through this controller include:

- TTL user trigger input and output line
- Interface PC address/data/control signals to the scanners
- Interface to the receiver providing 32 relay drivers, fixture ID, and safety interlocks.

Figure C–6 shows the MXI-VXIscan Controller's connector locations. Connectors J1–4 dock with the connectors on the back of the receiver. Connectors P1, P3, and P4 dock with the adaptor which is attached to the Slot 0 VXIbus controller.

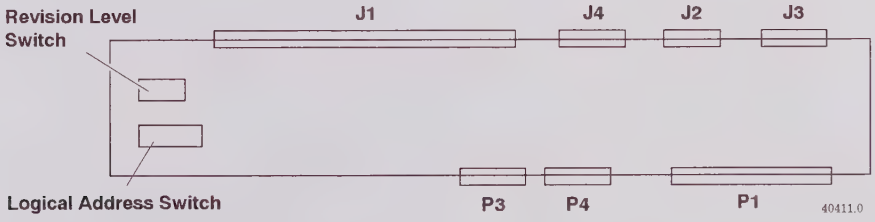


Figure C–6 Connector Locations for the MXI-VXIscan Controller

MXI-VXIscan Controller Specifications

The following tables contain some key specifications for the MXI-VXIscan controller.

Table C–3
Fixture Relay Driver DC Parameters

Number of Relay Drivers	32
Configuration	open collector
Common Voltage	50V maximum
Continuous Sink Current	200 mA maximum (Resistive Load)
Driver Saturation Voltage	1.3V maximum @ 200mA
Max Power Per Pin	.25W
Leakage Current	100 μA maximum

Table C–4
Fixture ID Electrical Specification

V_{ih} minimum	2.0V @ 0.73 ma1
V_{il} maximum	0.80V @ 1.73 ma

Table C–5
VXI Trigger Input

V_{ih} minimum	2.0V @ 0.76 ma
V_{il} maximum	0.82V @ 5.24 ma

Table C–6
VXI Trigger Output

V_{oh} minimum	2.4V unloaded 2.28V @ –3.0 ma
V_{ol} maximum	0.4V unloaded 0.89V @ 12.0 ma

Table C–7
Environmental Requirements

Operating Temperature	class 2 limits of +10 to +40°C @ 10–90% relative humidity
Operating Wet Bulb Temperature	28°C maximum
Operating Dew Point	2°C minimum
Nonoperating Temperature	class 2 limits of –40 to +66°C hot cycle limits @ 95% relative humidity
Nonoperating Wet Bulb Temperature	46°C maximum
Nonoperating Dew Point	2°C minimum

Power Requirements

The MXI-VXIscan Controller gets all its power from the +5.1V power supply wired to the scanner backplane. There is little change in power dissipation when transferring data versus being in an idle state. The nominal current consumption is 4.25A.

Receiver Interface Pin Assignments

The pin assignments at the Receiver Interface connector are shown in Figure C–7.

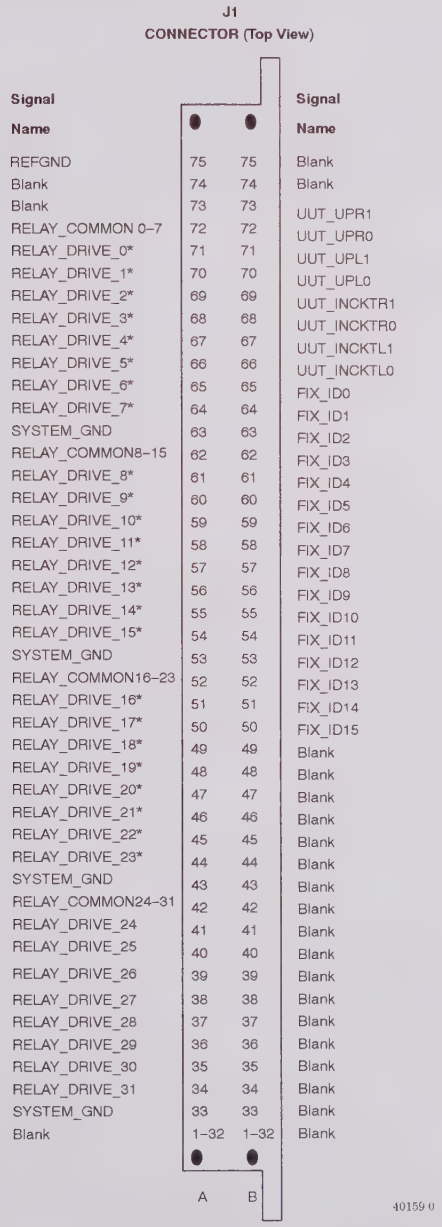


Figure C–7 Receiver Interface Connector J1

For more detailed technical information about the MXI-VXIscan Controller, refer to the *GENEVA Hardware Modules Manual*.

Instrument and Scanner Configurations

Table C–8 illustrates the standard configuration of VXIbus instruments located in the VXIbus backplane in the GR1000*e*, GR2000, and GR4000 test systems. The VXIbus Controller is located in slot 0. The other instruments are slot independent and can reside in any slot.

Table C–8
GR1000*e*, GR2000, and GR4000
VXIbus Backplane

Slot Numbers	Instrument Name
0	Controller
1	Instrument #1
2	Instrument #2
3	Instrument #3
4	Instrument #4
5	Instrument #5
6	Instrument #6
7	Instrument #7
8	Instrument #8
9	Instrument #9
10	Instrument #10
11	Instrument #11
12	Instrument #12

Table C–9 illustrates the standard configuration for VXIscan scanners located in the VXIscan backplane.

Table C–9
VXIscan Backplane

Slot Numbers	Scanner Name
V0	Scanner Controller
X0	Scanner Controller
V1	Scanner #1
X1	Scanner #2
V2	Scanner #3
X2	Scanner #4
V3	Scanner #5
X3	Scanner #6
V4	Scanner #7
X4	Scanner #8
V5	Scanner #9
X5	Scanner #10
V6	Scanner #11
X6	Scanner #12
V7	Scanner #13
X7	Scanner #14
V8	Scanner #15
X8	Scanner #16
V9	Scanner #17
X9	Scanner #18
V10	Scanner #19
X10	Scanner #20
V11	Scanner #21
X11	Scanner #22
V12	Scanner #23
X12	Scanner #24

System Power

Refer to Chapter 6 for system power specifications.

Power Monitor Board

The power monitor board monitors key parameters in the system. The power monitor uses a RS-232 serial line to communicate with the PC. The power monitor also receives input data from various sensors, the system power supply, and several DC voltage buses.

CAUTION **The power monitor activates the power monitor board LEDs to indicate the out-of-tolerance element when it identifies a Warning or Panic mode condition. When a Warning mode condition occurs, the system keeps running. If the Warning mode condition continues for 10 minutes, the power monitor shuts down the system.**

NOTE The Panic mode response is not implemented in the GR1000*e*, GR2000, and GR4000 test systems.

Cooling System

The cooling fan assembly is located in the rear of the system bay. These fans provide forced air cooling for the VXIbus instruments.

The VXIcage is designed for optimum cooling with a full complement of instruments. You must insert an optional C-size cooling baffle (PN 9001-0274-00) or D-size cooling baffle (P/N 9001-0422-00) into each empty VXIbus slot to maintain maximum cooling performance. Figure C-8 and Figure C-9 are charts of pressure drop vs air velocity for the VXIcage. One curve shows air flow for an open cage. The other curve shows air flow for a full cage, using any combination of instruments and baffles. Cooling baffles are shown in Figure C-10.

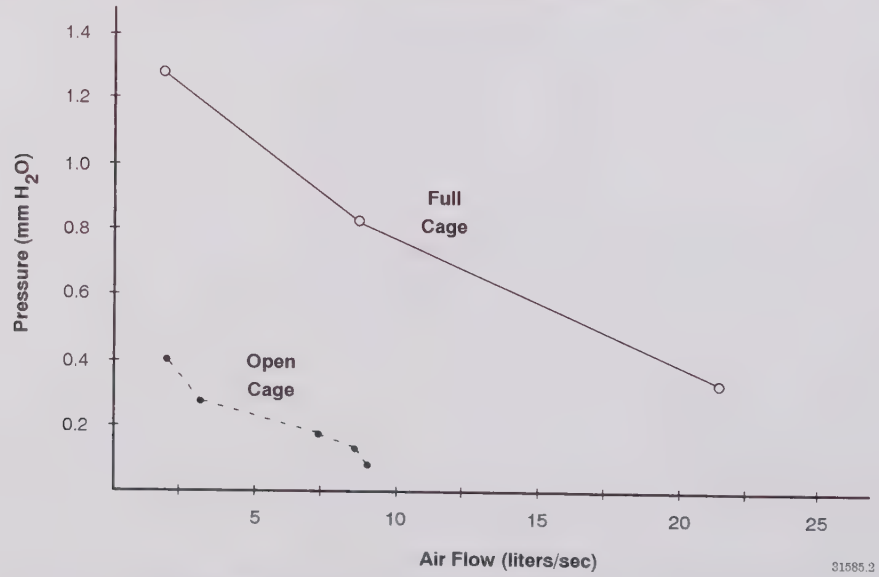


Figure C-8 GR1000*e*, GR2000 Air Flow vs Pressure Drop in the VXIcage

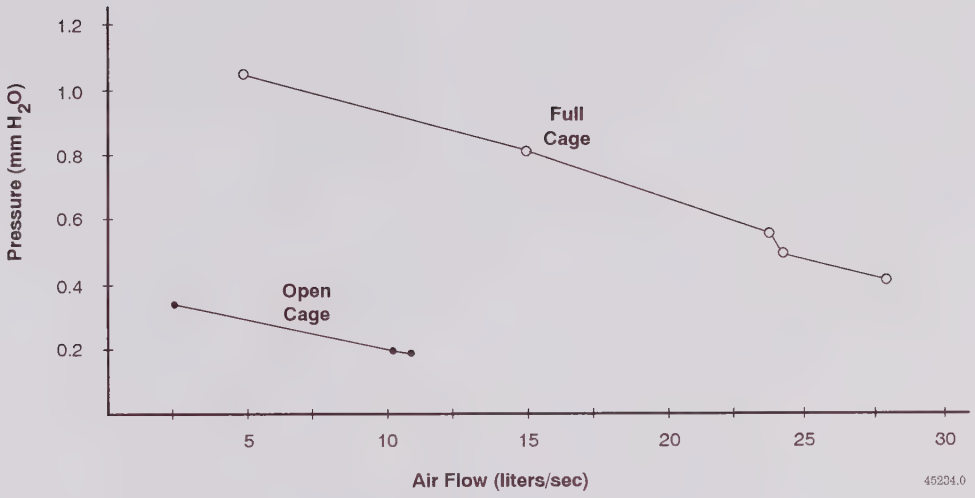


Figure C–9 GR4000 Air Flow vs Pressure Drop in the VXIcage

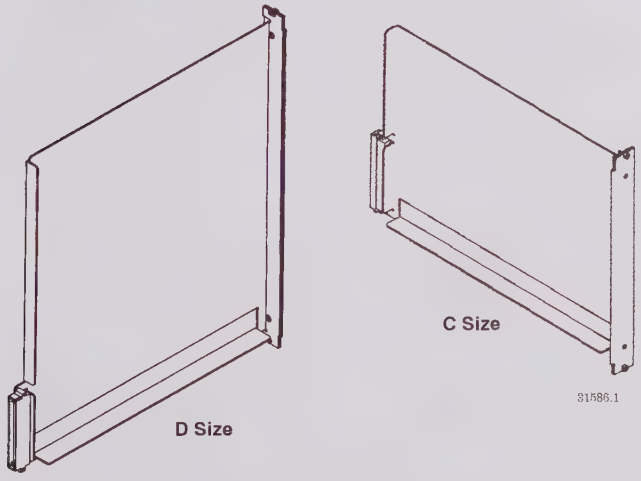
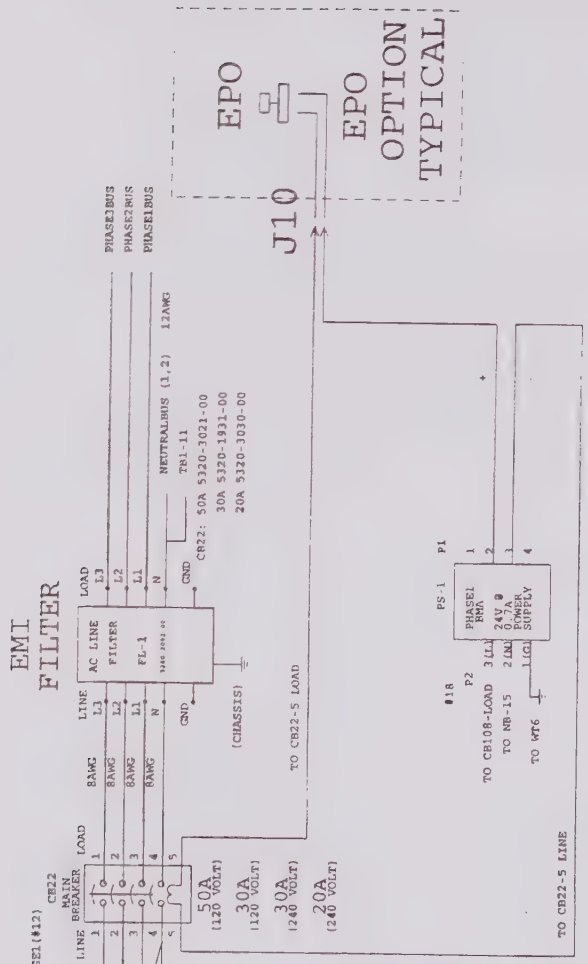


Figure C–10 Cooling Baffles for Empty VXI Instrument Slots

3 Phase Power Controller Schematics

The 3 Phase Power Controller schematic diagram is shown in Figure C–11.



XXXX-	DESCRIPTION: POWER CONFIGURATION, INCLUDES: 9001-XXXX-00
0685-	120V 60A, WITH EXTRA OUTLETS
0496-	120V 60A, WITH TERMINAL BLOCK
0682-	120V 30A, WITH EXTRA OUTLETS
0683-	240V 32A, WITH EXTRA OUTLETS
0684-	240V 16A, WITH EXTRA OUTLETS

Figure C–11 3 Phase Controller Schematic Diagram (Sheet 1 of 4)

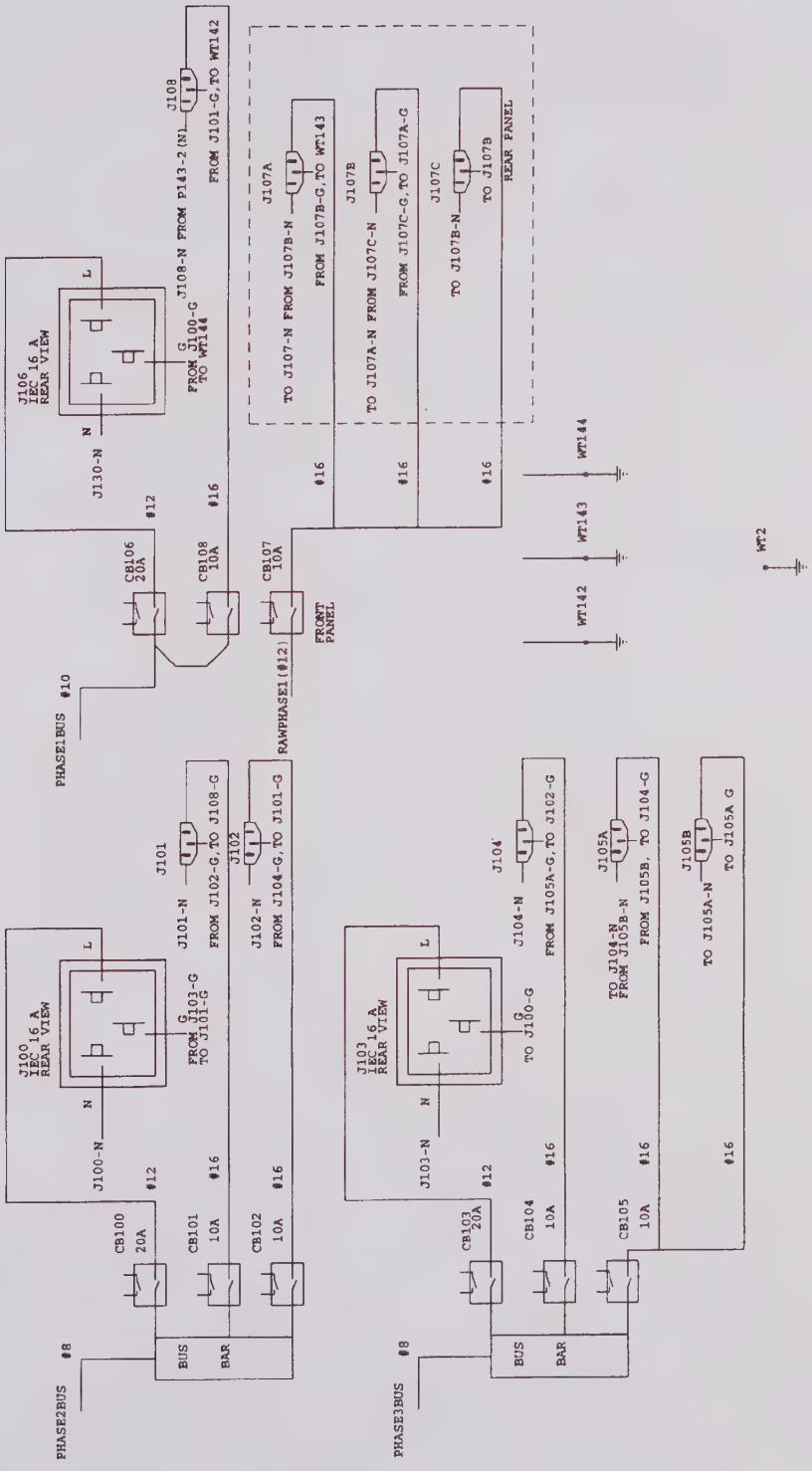


Figure C–11 3 Phase Controller Schematic Diagram (Sheet 2 of 4)

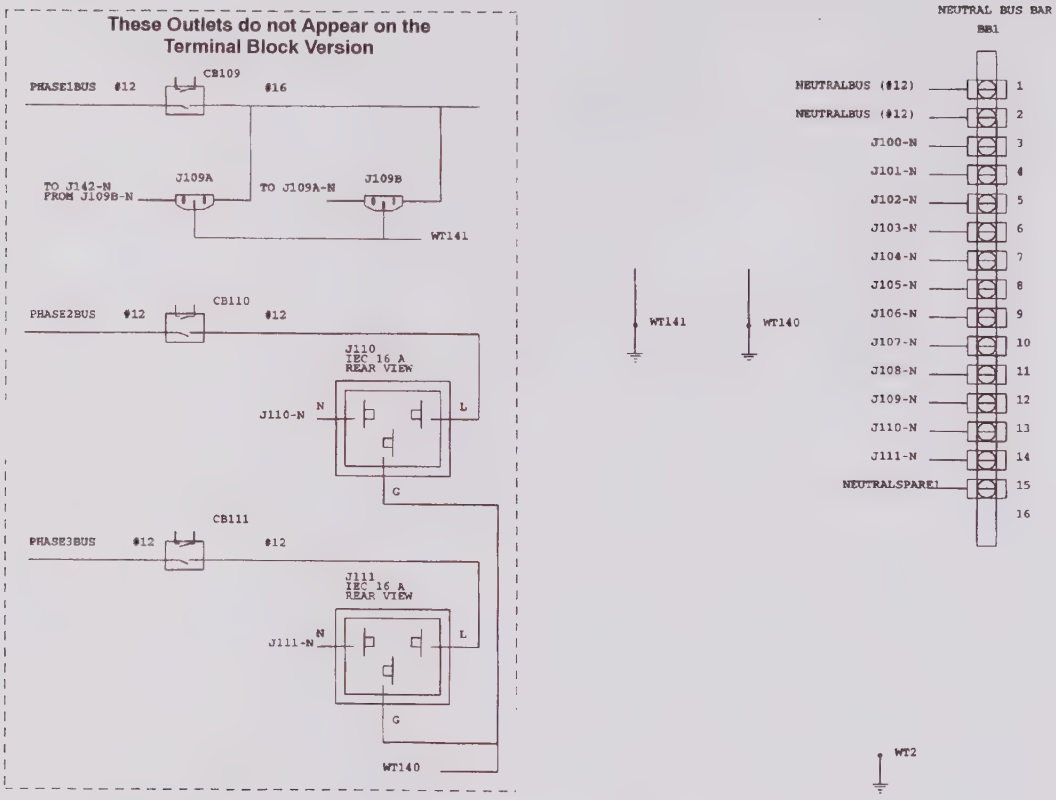


Figure C–11 3 Phase Controller Schematic Diagram (Sheet 3 of 4)

Figure C–11 3 Phase Controller Schematic Diagram (Sheet 4 of 4)

Load Tables

WARNING **The ampere ratings of the individual configurations are specified in the Load Tables 1–11. A separate chart for each of the input power configurations lists the maximum loading of the individual circuits and their associated receptacles. The loads associated with the optional terminal strip are normally connected from phase to neutral, but can be connected from phase to phase, provided that the load chart for the specific system identifies the load as such, and specifies the required protective devices and wire size. It also insures that the circuit protection for the load operates if there is an overload on either load wire. The circuit protection for any load associated with the terminal strip is the "main circuit breaker/main system disconnect switch."**

Table C–10
Load Table 1

P/N 9001–0685–00	Rated: 208/120V, 3 Phase, 48A/ phase
Configuration: 120V/60A	Required Service: 208/120V, 3 Phase, 60A/ phase

Phase	Receptacle(s)	Protective Device/Rating	Voltage Rating
1	J106	CB106/20A	120V
1	J108	CB108/10A	120V
1	J107A	CB107/10A	120V
1	J107B	CB107/10A	120V
1	J107C	CB107/10A	120V
1	J109A	CB109/10A	120V
1	J109B	CB109/10A	120V
2	J100	CB100/20A	120V
2	J101	CB101/10A	120V
2	J102	CB102/10A	120V
2	J110	CB110/20A	120V
3	J103	CB103/20A	120V
3	J104	CB104/10A	120V
3	J105A	CB105/10A	120V
3	J105B	CB105/10A	120V
3	J111	CB111/20A	120V

NOTE For Table C–10, the maximum current available from any single receptacle (i.e. J106) or a combination of receptacles connected to a single protective device (i.e., J107A–J107C) must not exceed the rating of the receptacle(s) protective device. The total maximum current from all receptacles on each phase must not exceed 48A total.

Table C–11
Load Table 2

P/N 9001–0496–00	Rated: 208/120V, 3 Phase, 48A/ phase
Configuration: 120V/60A – With terminal block	Required Service: 208/120V, 3 Phase, 60A/ phase

Phase	Receptacle(s)	Protective Device/Rating	Voltage Rating
1	J106	CB106/20A	120V
1	J108	CB108/10A	120V
1	J107A	CB107/10A	120V
1	J107B	CB107/10A	120V
1	J107C	CB107/10A	120V
1	TB1–5	CB22 (see note)	120V
1	TB1–6	CB22 (see note)	120V
2	J100	CB100/20A	120V
2	J101	CB101/10A	120V
2	J102	CB102/10A	120V
2	TB1–7	CB22 (see note)	120V
2	TB1–8	CB22 (see note)	120V
3	J103	CB103/20A	120V
3	J104	CB104/10A	120V
3	J105A	CB105/10A	120V
3	J105B	CB105/10A	120V
3	TB1–9	CB22 (see note)	120V
3	TB1–10	CB22 (see note)	120V

NOTE

For Table C–11, the maximum current available from any single receptacle (i.e. J106) or a combination of receptacles connected to a single protective device (i.e., J107A–J107C) must not exceed the rating of the receptacle(s) protective device. Each section of the terminal blocks (i.e. TB1–5) must not exceed 35A/section. The total maximum current from all receptacles and terminal blocks on each phase must not exceed 48A total.

Table C–12
Load Table 3

P/N 9001–0682–00	Rated: 208/120V, 3 Phase, 24A/ phase
Configuration: 120V/30A	Required Service: 208/120V, 3 Phase, 30A/ phase

Phase	Receptacle(s)	Protective Device/Rating	Voltage Rating
1	J106	CB106/20A	120V
1	J108	CB108/10A	120V
1	J107A	CB107/10A	120V
1	J107B	CB107/10A	120V
1	J107C	CB107/10A	120V
1	J109A	CB109/10A	120V
1	J109B	CB109/10A	120V
2	J100	CB100/20A	120V
2	J101	CB101/10A	120V
2	J102	CB102/10A	120V
2	J110	CB110/20A	120V
3	J103	CB103/20A	120V
3	J104	CB104/10A	120V
3	J105A	CB105/10A	120V
3	J105B	CB105/10A	120V
3	J111	CB111/20A	120V

NOTE

For Table C–12, the maximum current available from any single receptacle (i.e. J106) or a combination of receptacles connected to a single protective device (i.e., J107A–J107C) must not exceed the rating of the receptacle(s) protective device. The total maximum current from all receptacles on each phase must not exceed 24A total.

Table C–13
Load Table 4

P/N 9001–0683–00	Rated: 380–415/220–240V, 3 Phase, 30A/phase
Configuration: 240V/30A	Required Service: 380–415/220–240V, 3 Phase, 30A/phase

Phase	Receptacle(s)	Protective Device/Rating	Voltage Rating
1	J106	CB106/20A	220–240V
1	J108	CB108/10A	220–240V
1	J107A	CB107/10A	220–240V
1	J107B	CB107/10A	220–240V
1	J107C	CB107/10A	220–240V
1	J109A	CB109/10A	220–240V
1	J109B	CB107/10A	220–240V
2	J100	CB100/20A	220–240V
2	J101	CB101/10A	220–240V
2	J102	CB102/10A	220–240V
2	J110	CB110/20A	220–240V
3	J103	CB103/20A	220–240V
3	J104	CB104/10A	220–240V
3	J105A	CB105/10A	220–240V
3	J105B	CB105/10A	220–240V
3	J111	CB111/20A	220–240V

NOTE

For Table C–13, the maximum current available from any single receptacle (i.e. J106) or a combination of receptacles connected to a single protective device (i.e., J107A–J107C) must not exceed the rating of the receptacle(s) protective device. The total maximum current from all receptacles on each phase must not exceed 30A total.

Table C–14
Load Table 5

P/N 9001–0684–00	Rated: 380–415/220–240V, 3 Phase, 16A/phase
Configuration: 240V/16A	Required Service: 380–415/220–240V, 3 Phase, 16A/phase

Phase	Receptacle(s)	Protective Device/Rating	Voltage Rating
1	J106	CB106/20A	220–240V
1	J108	CB108/10A	220–240V
1	J107A	CB107/10A	220–240V
1	J107B	CB107/10A	220–240V
1	J107C	CB107/10A	220–240V
1	J109A	CB109/10A	220–240V
1	J109B	CB107/10A	220–240V
2	J100	CB100/20A	220–240V
2	J101	CB101/10A	220–240V
2	J102	CB102/10A	220–240V
2	J110	CB110/20A	220–240V
3	J103	CB103/20A	220–240V
3	J104	CB104/10A	220–240V
3	J105A	CB105/10A	220–240V
3	J105B	CB107/10A	220–240V
3	J111	CB111/20A	220–240V

NOTE

For Table C–14, the maximum current available from any single receptacle (i.e., J106, J100, or J103, and J111) must not exceed 16A. The total maximum current from any combination of receptacles must not exceed the rating of the receptacle(s) protective device. The total maximum current from all receptacles on each phase must not exceed 16A total.

Removing System Power

The main circuit breaker (CB–22), when turned off, removes power to the receptacles (except for J107A–J107C) and the terminal block, if installed. To completely remove power to all receptacles both CB–22 and CB107 on the controller's front panel must be in the "OFF" position. Refer to front panel view, Figure C–12. To completely remove all power from the system, the power cord must be removed from its power source.

EPO Option

An EPO (Emergency Power Off) option is available and consists of a normally open push–button switch (with a built–in mechanical latching mechanism) mounted on a panel, a 24V power supply PN 6067–8082–00, and a cable that interfaces to the power distribution unit at J10. The normally open EPO switch (when actuated) applies 24Vdc from the EPO power supply within the PDU to the "Drop–Out–Coil" of the controller's main circuit breaker. This causes the breaker to trip and remove power to the system (with the exception of (J107A–J107C). The EPO will not effect the standard power monitor auto shutdown function. Resetting the system after actuating an EPO button requires two actions:

- The built in mechanical latching mechanism of the EPO must be manually reset by twisting the button counterclockwise, and:
- The main circuit breaker/main system disconnect switch (CB–22) must be manually turned on.

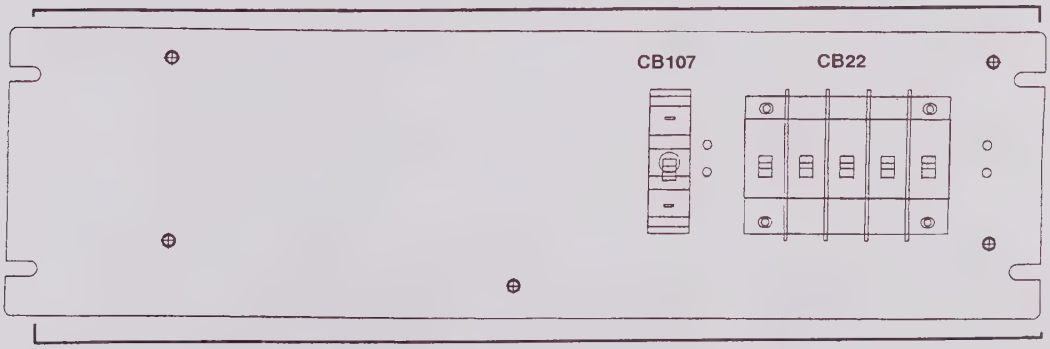


Figure C–12 3 Phase Power Controller (Front View)

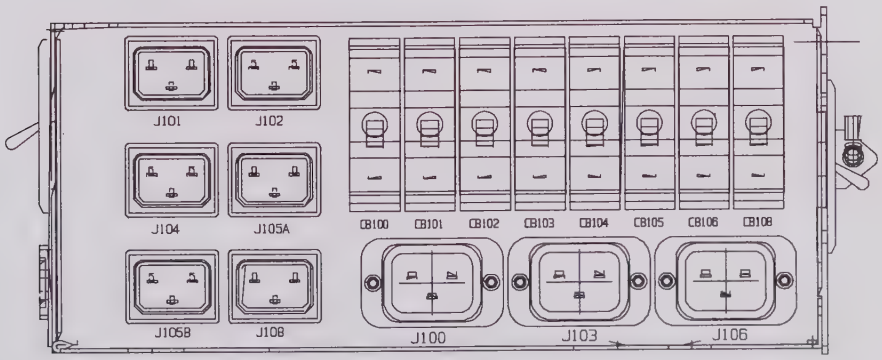


Figure C–13 3 Phase Power Controller (Left Side View)

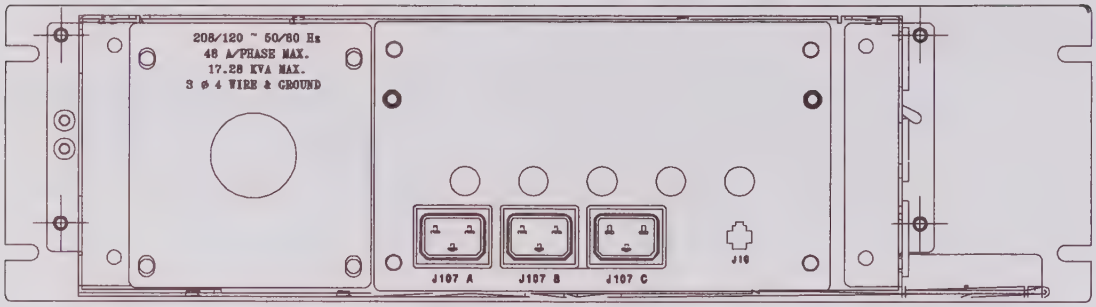


Figure C–14 3 Phase Power Controller, Standard Configuration (Rear View)

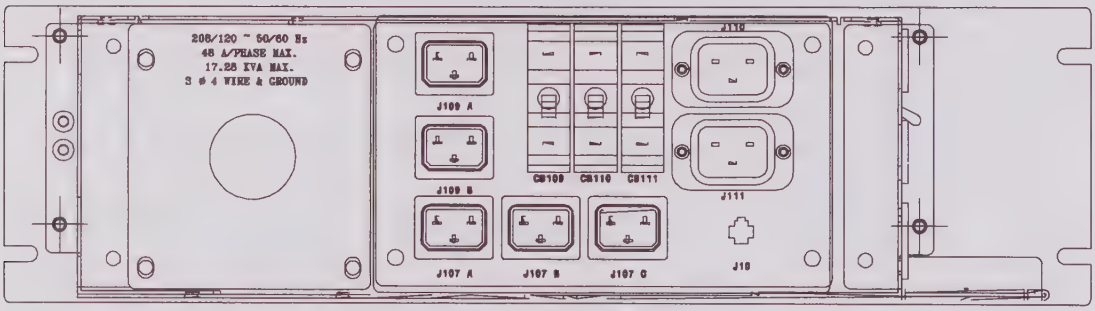


Figure C–15 3 Phase Power Controller, with Extra Outlets (Rear View)

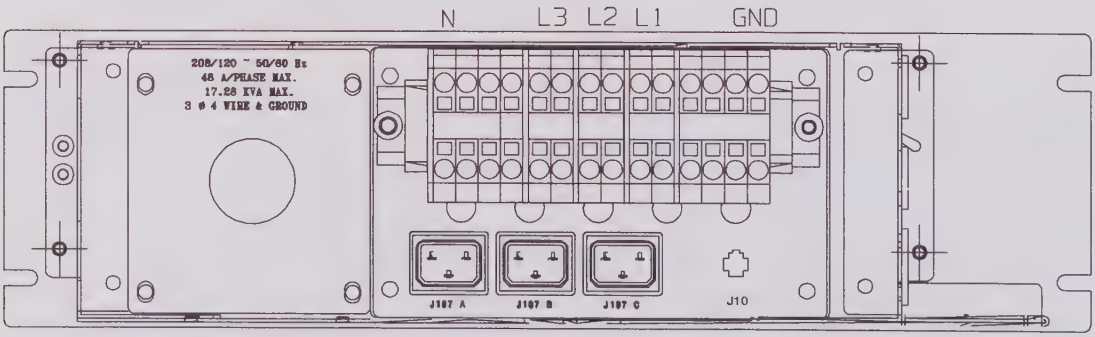


Figure C–16 3 Phase Power Controller, with Terminal Block TB1 (120V/60A only) (Rear View)

TB1 Wiring Connections

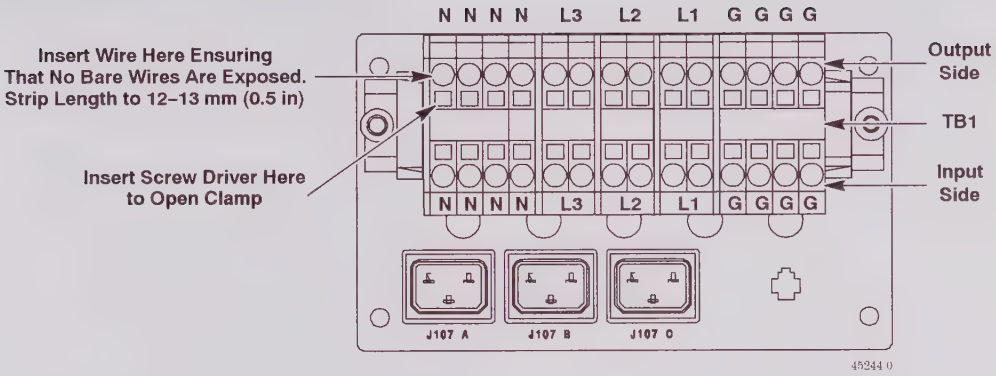
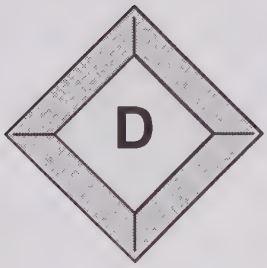

N N N N L3 L2 L1 G G G G
Insert Wire Here Ensuring That No Bare Wires Are Exposed. Strip Length to 12–13 mm (0.5 in)
Insert Screw Driver Here to Open Clamp
Output Side
TB1
Input Side
N N N N L3 L2 L1 G G G G
J107 A
J107 B
J107 C
45244 0

Figure C–17 Numbering and Basic Purposes of Terminals on Terminal block TB1

GR1000*e*, GR2000, and GR4000 Vacuum Controller



Introduction

The optional GR1000*e*, GR2000, and GR4000 Vacuum Controller is a 19-inch rack-mountable unit that controls the flow of vacuum for vacuum UUT fixtures used with these systems.

Vacuum Specifications

The GR1000*e*, GR2000, and GR4000 Vacuum Controller requires the following user provided vacuum:

Table D–1
User Provided Vacuum

Minimum Vacuum	Minimum Airflow
23 in HG	20 CFM

Figure D–1 shows the vacuum controller FRUs and internal components.

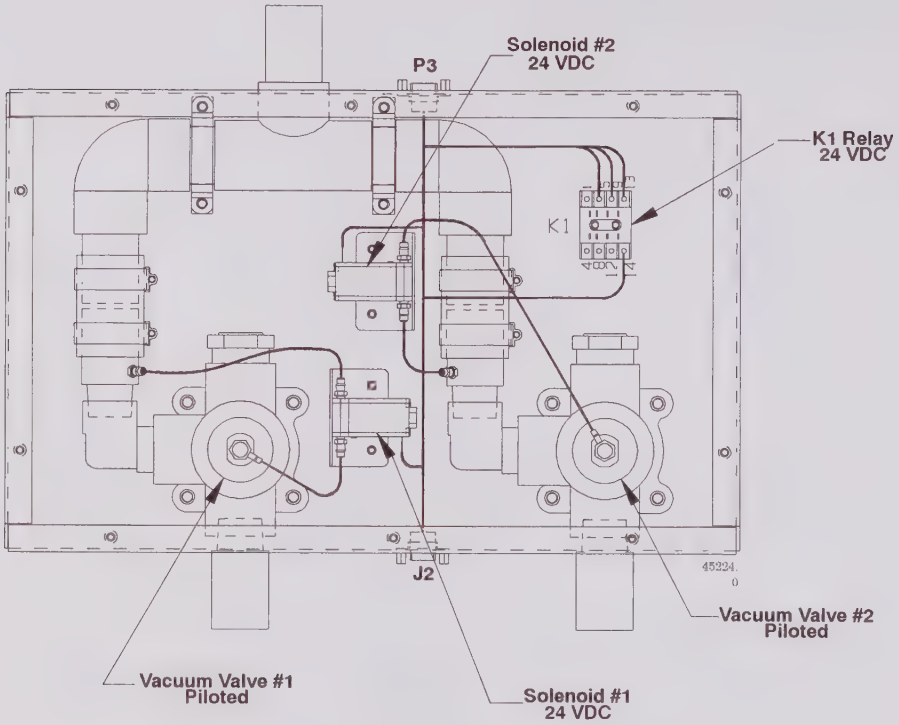


Figure D–1 Vacuum Controller FRUs

Installation

This section describes the installation procedures for the GR1000*e*, GR2000, and GR4000 Vacuum Controller.

Installing the Vacuum Controller

Use the following procedural steps to attach the mounting brackets and mount the vacuum controller in the Schroff cabinet.

NOTE

The suggested mounting location of the vacuum control unit is the bottom of the Schroff cabinet replacing a dress panel two rack units high. You may need to rearrange existing dress panels to accommodate the control unit. If so, reposition the panel and secure it to the 2nd and 5th holes from the bottom of the cabinet on each side.

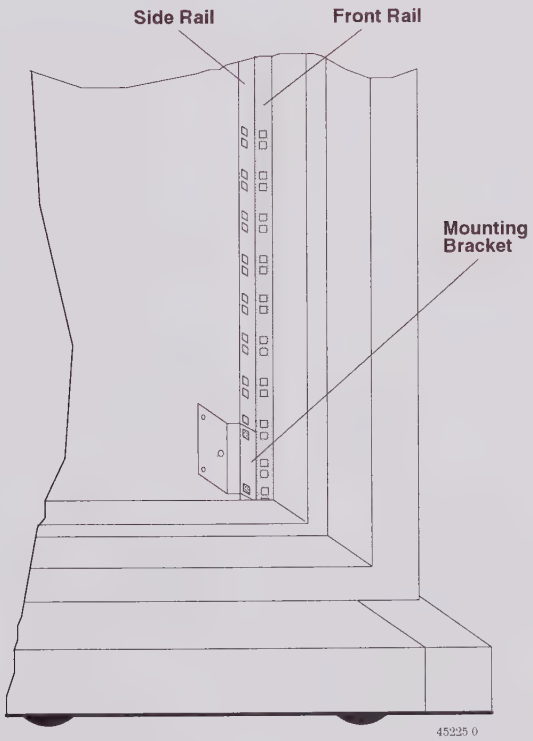


Figure D–2 Schroff Cabinet – Front Right Side View

NOTE Be sure to power down the system before performing the following procedure.

➤ To attach the mounting brackets and mount the vacuum control unit in the cabinet

1 Remove the (2) quarter-turn screws from the top of each exterior side panel. Then, carefully remove the ground wire and lift each side panel up and away from the cabinet.

2 Remove the (4) large Phillips head screws from the dress panel located at the bottom front of the cabinet and remove the dress panel from the cabinet.

3 Before installing the mounting brackets in the cabinet, attach the (4) clip nuts provided. Attach 2 of the 4 clip nuts to each front side rail – one to the 2nd hole up from the bottom and the other to the 5th hole up in line with the clip nuts on the front rails. The nuts should be inserted from the outside of the mounting rail.

NOTE Control units are shipped with (2) mounting brackets attached to the unit. Remove them from unit (sides) and install them in the cabinet.

4 Position each mounting bracket (P/N 9025-2443-00) with the notched side against the inside of the rail and the bend facing the center of the cabinet. Align bracket with clip nuts and secure the bracket to the rail using the dress screws and plastic washers provided.

5 Slide the vacuum control unit into the front of the cabinet and secure it to the front rails using the 4 (2 on each side) dress screws and plastic washers provided.

6 Mount the unit to the side brackets using the 6 (3 on each side) Phillips captive screws.

➤ To install the control unit and make the necessary connections

Figure 1-10 and Figure 1-11 in Chapter 1 show the VXIcage I/O panel connectors.

1 If present, disconnect the Power Distribution Cable (PDU) from J216 on the I/O panel located at the rear of the test system's VXI cage.

2 Plug the 9-pin male connector from the Y-adapter cable (P/N 9003-0964-00) into J216 on the I/O panel.

3 Attach one of the (2) vacuum control cables (P/N 9003-0542-00) to one of the Y-adapter connectors, route this cable through the cabinet to the rear of the vacuum control unit and connect it to P3 on the rear of the unit. If present, attach the PDU cable to the remaining connector on the Y-adapter cable.

4 Attach the second vacuum control cable to J2 on the front of the vacuum control unit. This cable attaches to the UUT fixture to be wired to a relay driver and system ground as outlined below.

5 Attach the incoming vacuum line to the rear single input port of the vacuum control unit. The front of the unit has two input ports that connect to the fixture.

User Fixture Wiring of Control Lines

Attach the vacuum controller front cable to your fixture. Wire these to any available User relay driver and system ground pin on the scanner controller:

Pin 5	Relay driver
Pin 6	System ground

Refer to Chapter 6 of the *GENEVA Hardware Modules Manual* for information and supportive graphics regarding the relay driver and system ground connections.

NOTE Both vacuum ports operate at the same time. This provides adequate air flow to handle larger modules.

For more information about Relay Driver operation, refer to the *ENCOMPASS User's Guide*, for test systems running ENCOMPASS 1.3 software, or to the *Guide to ENCOMPASS,* for test systems running ENCOMPASS 2.0.1 software.

Fixture Relay Driver Electrical Specification

Fixture relay driver DC parametrics

Number of relay drivers available	32
Configuration	open collector
Common voltage	50V maximum
Continuous sink current	200 mA maximum
Maximum power per pin	0.25W
Driver saturation voltage	1.3V maximum @ 200 mA
Leakage current	100 μA maximum

Relay common: Clamp diodes for relays (4 groups)

CAUTION **The above specifications are for a resistor load when using an inductive load, such as a larger solenoid. It is recommended that the solenoid is controlled through another relay, as shown in Figure D–3.**

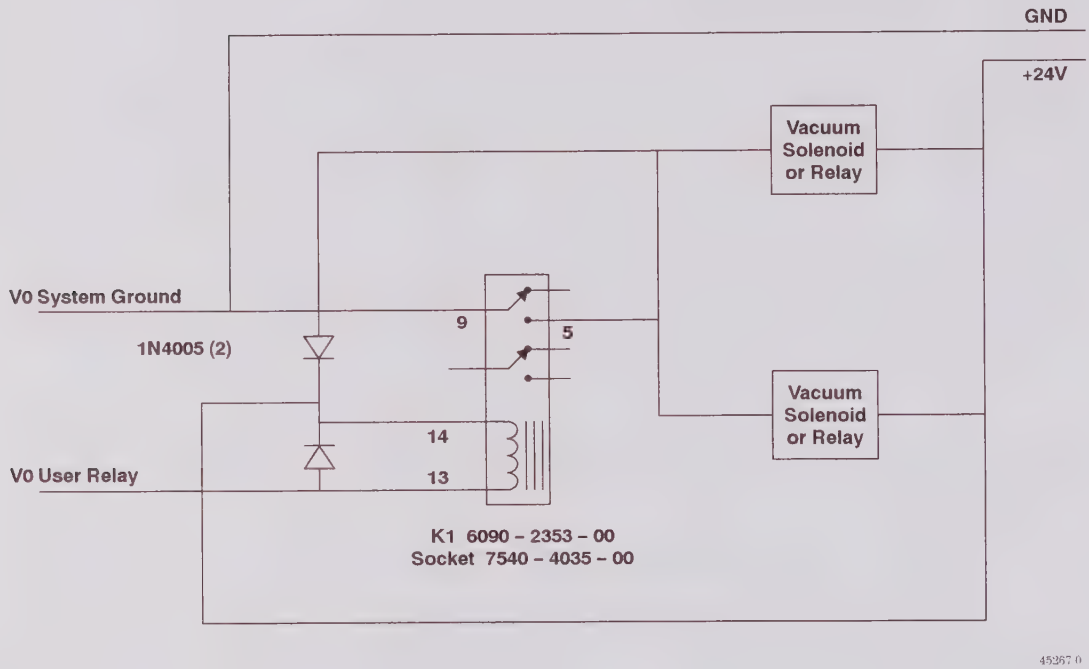


Figure D–3 Fixture Relay Driver

Field Replaceable Units (FRUs)

This section contains ordering information for the GR1000*e*, GR2000, and GR4000 Vacuum Controller FRUs, vacuum hoses, and miscellaneous parts. Table D–2 contains part numbers and descriptions for the FRUs. Table D–5 contains part numbers and descriptions for the miscellaneous parts.

Table D–2
Vacuum Controller Kit (P/N 9010–0614–00)

P/N	Description	Quantity
9001–0371–00	Vacuum Control Assembly	1
9003–0542–00	External Vacuum Control Cable	2
9003–0964–00	PDU Power Controller Y Cable	1
7042–0016–00	Dress Screw (Schroff)	8
8150–3508–00	Plastic Washer (Schroff)	8
5840–1808–00	Clip Nut (Schroff)	8
9006–0508–00	Front Panel	1
7270–0006–00	Dress Screws	4
9025–2443–00	Mounting Brackets	2
7044–6055–00	10–32 X 0.5 Shakeproof Screw	6

Table D–3
Vacuum Hose Kit (short) – (P/N 9010–0246–00)

P/N	Description	Quantity
9030–0015–00	32″ Vacuum Hose, Flexible	2
9030–0013–00	88″ Vacuum Hose, Flexible	1
2267–7020–00	Coupling	1

Table D–4
Vacuum Hose Kit (long) – (P/N 9010–0245–00)

P/N	Description	Quantity
2272–9993–00	32″ Vacuum Hose, Flexible	2
9030–0013–00	88″ Vacuum Hose, Flexible	1
2267–7020–00	Coupling	1

Table D–5
Miscellaneous Spare Parts

P/N	Description
5270–4962–00	Piloted Vacuum Valve
6090–2353–00	K1, 24VDC Relay
5270–0038–00	Solenoid, 24VDC

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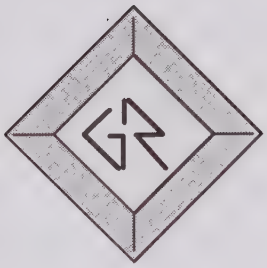

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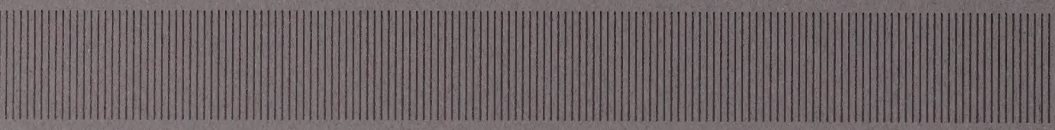

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